HEALTHCARE EMPLOYEES' BURNOUT, JOB STRESS, HEALTH, AND WORKPLACE

SOCIAL NETWORKS: ADDRESSING THE QUADRUPLE AIM

By

Erin M. Sesemann

December, 2019

Co-Directors of Dissertation: Katharine W. Didericksen, PhD and Angela L. Lamson, PhD

Major Department: Human Development and Family Science

With the goal of optimizing its performance, the health care field has widely accepted the Triple Aim, which called on health care organizations to provide high quality, accessible care by attending to 1) population health, 2) patients' experience of care, and 3) per capita cost for healthcare. Expanding from a Triple to Quadruple Aim by including a fourth aim targeted at improving the health and wellbeing of healthcare employees holds great potential for being an effective approach to improve the performance of health care. This dissertation is focused on increasing the scientific understanding about the fourth aim (i.e., healthcare providers' health and wellbeing) of the Quadruple Aim through examining the associations between job stress, workplace social networks, and employees' burnout and physical health through the framework of social network theory. There are six chapters in this dissertation, including: (a) an introduction chapter into the Triple to Quadruple Aim Framework, (b) literature review chapter that introduces social network theory as a theoretical foundation to examine the influence of workplace interpersonal relationship on employees' health and wellbeing, (c) systematic review of empirical articles to examine how workplace social networks are associated with workplace health outcomes, (d) methodology chapter describing the original quantitative research study, (e) original research reporting the results of the quantitative study that examined how workplace

social networks changed the association between employees' job stress and employee health outcomes (i.e., burnout, and physical health), and (f) discussion chapter that appraised the study's contributions to science, applied the results to future research recommendations to advance the national movements, and offered practice recommendations for healthcare organizations.

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ADDRESSING THE QUADRUPLE AIM

A Dissertation Presented to

The Faculty of the Department of Human Development and Family Science

East Carolina University

In Partial Requirements for the Degree

Doctor of Philosophy for Medical Family Therapy

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APPROVED BY:

CO-DIRECTOR OF
DISSERTATION:_____
                                                  Katharine W. Didericksen, PhD

CO-DIRECTOR OF
DISSERTATION:_____
                                                  Angela Lamson, PhD

COMMITTEE MEMBER: _____
                                                  Alexander M. Schoemann, PhD

COMMITTEE MEMBER: _____
                                                  Bhibha M. Das, PhD

CHAIR OF THE DEPARTMENT
OF HUMAN DEVELOPMENT & FAMILY SCIENCE:

_____
                                                  Sharon Ballard, PhD

DEAN OF THE
GRADUATE SCHOOL: _____
                                                  Paul J. Gemperline, PhD

DEDICATION

This dissertation is dedicated to all the healthcare professionals who tirelessly strive to improve the health and wellbeing of individuals and families in eastern North Carolina. In a geographical region with high demand and low resources, your passion and commitment to care for its residents is truly an inspiration. It has been a joy to work with you.

ACKNOWLEDGEMENTS

First, I would like to acknowledge my advisors and dissertation committee members. My co-chairs, Drs. Katharine Didericksen and Angela Lamson, have provided excellent advising throughout my project, pushing me to become independent in conducting relational, multiculturally-informed research. Their knowledge, comments, questions, reflections, and support were invaluable throughout this challenging process. Dr. Alexander Schoemann's mentorship in quantitative methodology and statistical analysis has been invaluable to my growth as a researcher. I will always appreciate how his guidance was always accompanied by humor and support. Dr. Bhibha Das, my final committee member, provided thoughtful feedback on the practicality of my research. Her thoughtful questions, comments, and support helped me consider how to close the gap between research-practice by planning how I might translate my research into implications and recommendations for future programs and policy. I am truly grateful for the contributions from each one of my committee members throughout my dissertation.

I will also be forever grateful for my wonderfully caring family, highly empathetic best friend, and loving husband for their steadfast support throughout my doctoral program. I am so blessed to have parents who have always encouraged my academic pursuit and siblings who never fail to bring an element of humor to stressful times in life. Mom, Papa, Jeff, and Kelly, due to the family values imparted by you all with love and witty commentaries, I had a solid foundation to build my career. Stephanie, I am so appreciative of your willingness to help me mentally and emotionally process all the challenges I have encountered on this journey. Your friendship was a critical element to maintaining my connection to life outside of academia. I cannot imagine going through a doctoral program without a friend like you. Lastly, I will be forever grateful for my compassionate, grounded husband, Jim, whose daily, unwavering love

and support was invaluable to completing my doctoral degree. He had a knack at helping me take a break, change my perspective by seeing the "bigger picture" in life, and always encouraged me to try something new or seek new opportunities. I cannot wait to continue to dream big with you and see what is next for the two of us.

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PREFACE

From my first research project as an undergraduate psychology student, I have been intrigued by the influence of relationships on human functioning. Pursuing relationship science brought me to the field of Marriage and Family Therapy and then, out of a desire to advocate for mental and relational health prevention and intervention services in health care, I sought out a doctoral degree in Medical Family Therapy (MedFT). This doctoral degree has prepared me to think and act from a systemic (von Bertalanffy, 1968) and biopsychosocial-spiritual perspective (Engel, 1977; 1980; Wright, Watson, & Bell, 1996) as I engage in research, patient care, and advocacy.

As I began working as a medical family therapist in integrated healthcare settings, I immediately noticed the passion and commitment of my multidisciplinary team members. They were dedicated to improving human lives through their unique occupations in health care. While we had different backgrounds and occupational roles, we often shared a common goal and seemed to have an affinity for the work. Unfortunately, despite the passion and commitment, there seemed to be a high rate of turnover and uncharacteristic, deteriorating compassion for poor health. Therefore, I started to investigate the longevity of healthcare employees. Quick to pop-up in my searches was the epidemic of burnout and reduced wellbeing in healthcare employees as well as the high rate of turnover for healthcare employees by either changing organizations or leaving the field entirely.

Through my MedFT lens, I brainstormed ways I could contribute to creating a sustainable workforce of healthcare employees. As a systemic, relational scientist-practitioner it was a natural fit to examine the influence of workplace interpersonal relationships on employees' burnout and wellbeing. As employees spend the majority of their time with their colleagues,

often spending longer-than-average hours at work, this was an essential area to investigate. I hope this research improves the understanding of how to optimize interpersonal relationships in the workplace to combat burnout and improve physical health. From the results of this dissertation, I provided practical recommendations for how to apply these results to future workplace programs and policies to promote a healthy, sustainable workforce of healthcare employees.

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CHAPTER 1: INTRODUCTION: FOCUSING ON THE QUADRUPLE AIM

To improve health care, the Institute of Healthcare Improvement (IHI) recommended organizations strive to design their clinical, operational, and financial procedures according to the Triple Aim framework: attend to population health, patients' experience of care, and per capita cost for healthcare at the same time (Institute of Healthcare Improvement, 2018). Lately, however, there are some healthcare providers, researchers, and policy makers who call for the Triple Aim to be expanded into a Quadruple Aim, preserving healthcare providers' health and wellbeing, because poorer employee health can compromise quality of care and increase its cost (Bodenheimer & Sinsky, 2014). Optimizing the psychosocial work environment through utilizing workplace interpersonal relationships is one avenue that healthcare organizations can take to promote healthy, productive employees and affordable health care (Leka & Jain, 2010). This dissertation is focused on increasing the scientific understanding about the fourth aim (i.e., healthcare providers' health and wellbeing) of the Quadruple Aim through examining the associations between job stress, workplace social networks, and employees' burnout and physical health through the framework of social network theory. In this dissertation, future research and practice recommendations about how to reduce burnout and improve employees' physical health are provided based on current literature (i.e., chapters 2 and 3) and original quantitative research (i.e., chapters 5 and 6). In this introductory chapter, the following sections will describe why the Quadruple Aim is important and conclude with an outline of the following dissertation chapters: literature review, systematic review, methods, results, and discussion.

Triple to Quadruple Aim

IHI set out to provide recommendations to improve health care that were focused on the patients' experience of care and based in the Institute of Medicine's six principles: safe,

effective, patient-centered, timely, efficient, and equitable (Committee on Quality of Health Care in American, 2001) To enhance these six principles simultaneously, IHI implemented a series of 90-day Research and Development workshops to develop the following Triple Aim framework: attend to population health, patients' experience of care, and per capita cost for healthcare at the same time (Institute of Healthcare Improvement, 2018). Based on the Triple Aim framework, the initiative was developed in Cambridge, Massachusetts (www.ihi.org) and started in 2007 to achieve the Triple Aim. The initiative was started by 15 organizations from the United States, England, and Sweden, grew to over 150 organizations in many different counties (i.e., Austria, England, Canada, Scotland, Singapore, Spain, Sweden, New Zealand, and United States), and ran from 2007-2014 (Lewis, 2014). To some, it has been enough to focus on these three aims to improve health care; yet, to others, the aims are incomplete.

Because unhealthy employees are more at risk for making mistakes, providing lower quality care, and being less present or productive (Borritz, Rugulies, Christensen, Villadsen, & Kistensen, 2006; Halbesleben, & Rathert, 2008; Salvagioni et al., 2017), there should be an additional focus on attending to providers' experience of working and caring for patients. There is evidence that the experience of providing care to patients can be deleterious for healthcare employees' health and wellbeing (Hodgkin, Paul, & Warbuton, 2017; Peter et al., 2002), which can carry over to impact the healthcare field's pursuit of the Triple Aim (i.e., attend to population health, patients' experience of care, and per capita cost for healthcare; www.ihi.org) because of its effects on their health and productivity. In general, organizations' goals (e.g., efficiency, cost reduction, cost savings) tend to be focused on costs, outcomes, or productivity.

From a social network perspective, one reason for this emphasis is because organizational leaders gathered or grouped people together "to get things done through the cooperation of

individuals" (Kadushin, 2012, p. 90), which is reflected in the Triple Aim's focus on outcomes of care and costs (i.e., patient outcomes, quality, per capita cost). The costs, productivity, and outcomes of health care are highly important to society, but the approach organizations take to achieve these goals may compromise their efforts by failing to consider the human elements behind the social network of people it has gathered to get things done. In health care, one way organizational leaders can rectify this trend is by transitioning to the Quadruple Aim through the incorporation of the fourth aim (i.e., improving healthcare employees' health and wellbeing) into the Triple Aim framework. There is evidence that incorporating a focus on employees' health and wellbeing can help organizations optimize their efforts toward improving their outcomes.

The Fourth Aim: Healthcare Employees' Health and Wellbeing

Healthcare providers' in worse health can become distracted (Salvagioni et al., 2017), absent (Borritz, Rugulies, Christensen, Villadsen, & Kistensen; 2006), less empathetic (Halbesleben, & Rathert, 2008), and more costly to the organization through increased insurance costs (Burton, 2014), medical errors (Shanafelt et al., 2010), or higher rates of turnover (Lu & Gursoy, 2016; Jones, 2008). Consequently, the ability to achieve the Triple Aim is likely compromised without including the fourth aim of attending to healthcare providers' health and wellbeing. In fact, there is evidence that healthcare providers are already suffering from their experiences of work. Hayashi and McDonnell (2009) found that the majority of healthcare professionals endorsed that their job was a significant source of stress in their lives due to different factors, such as insufficient resources to help patients, workload, and insufficient resources at workplace. Similarly, Peter et al. (2002) found that an efforts-rewards imbalance was linked with higher rates of heart attacks in women. These results suggest the balance

between workload and resources are important components to job stress and healthcare professionals' health and wellbeing.

Stressful or demanding work environments has also been associated with higher rates of burnout in healthcare employees, which has been labeled by IHI as an "epidemic" to health care (Perlo, Balik, Swensen, Landsman, & Feeley, 2017, p. 5). A recent Mayo Clinic survey (2015) found 54.4% of physicians reported experiencing burnout (i.e., emotional exhaustion, depersonalization, cynicism, loss of energy, feeling inadequate or ineffective), which was a nearly 10% increase in burnout from the last survey in 2011 (45.5%) and markedly higher than the general non-healthcare population (28.8%; Shanafelt et al., 2015). Burnout affects many different types of healthcare employees: nurses (Davis, Lind, & Sorensen, 2013; Moodie, Dulan, & Burke, 2014), psychiatrists and social workers (Lasalvia et al., 2009), counselors (Shoji et al., 2015), physicians from various specialties (e.g., emergency medicine, urology, family medicine, internal medicine, physical medicine and rehabilitation, etc.; Shanafelt et al., 2015), and medical residents (Prins et al., 2007). Additionally, reductions in emotional health (e.g., work stress, burnout) likely leads to other types of ailments, as burnout tends to be associated with Type 2 Diabetes, high body mass index, hypertension, heart disease, fatigue, pain, headaches, and early mortality (Salvagioni et al., 2017). These comorbidities are likely contributing to a less healthy and less productive workforce of healthcare employees who are unable to fully invest themselves into striving to achieve the Triple Aim due to their deteriorating mental and physical health. Therefore, transitioning to the Quadruple Aim can facilitate providing effective, efficient, safe, and quality patient care by preserving healthcare employees' health and wellbeing (Bodenheimer & Sinsky, 2017; Dyrbye et al., 2017; Feeley, 2017). Attending to the psychosocial work

environment, specifically workplace interpersonal relationships, is one relatively untapped resource organizations can utilize the help address the Quadruple Aim.

Psychosocial Work Environment

In its 2014 review on workplace health, the World Health Organization found that organizations in the United States tended to focus on improving employees' physical health through either physical safety regulations or health promotion programs, likely because employers bear the burden of healthcare or insurance costs. Health care, however, was found to be one exception to a near explicit focus on physical health as it incorporates the psychosocial work environment into its approach toward improving workplace health, defined as "a state of complete physical, mental, and social wellbeing, not merely the absence of disease" (Burton, 2014, p. 15). The psychosocial work environment is defined "as the aspects or design of work, and its social and organizational contexts that have the potential for causing psychological or physical harm (Leka & Jain, 2010, p. 4) and includes a variety of different factors (e.g., job content, work pace, job control, organizational culture, home-work interface). Interpersonal relationships in the workplace (e.g., with colleagues, subordinates, superiors) is one essential component of the psychosocial work environment that has been directly and indirectly associated with outcomes for employees' health (Leka & Jain, 2010), which is known to be associated with organizational outcomes (e.g., productivity and turnover intentions; Burton, 2014). This dissertation will utilize social network theory to conceptualize and measure workplace interpersonal relationships and explore how they are associated with employees' job stress, burnout, and physical health.

Purpose

The larger aim of this research was to expand the scientific understanding on how health care can optimize its approach toward providing affordable, quality, effective patient care through addressing how workplace interpersonal relationships contribute to people's health. With a better understanding about workplace social networks, more effective programs and policies can be developed to foster appropriate connectivity between employees to promote a healthy, more productive workforce. The purpose of this dissertation was to expand the understanding about how workplace social networks are associated with healthcare employees' job stress, physical health, and burnout. This research was pursued through a literature review, systematic review, and original quantitative empirical research.

The second chapter of this dissertation, titled *Improving Healthcare Employees' Burnout and Physical Health through Workplace Social Networks,* served as a literature review describing current literature on the associations amongst job stress, social networks, burnout, and physical health. Social network theory was introduced as an innovative way to conceptualize workplace interpersonal relationships and the chapter concluded by applying social network theory to future research and practice regarding the use of workplace interpersonal relationships for the prevention and intervention of burnout and physical health for healthcare employees.

The third chapter of this dissertation, titled *Intraorganizational Social Networks and Workplace Health: A Systematic Review* was a systematic review guided by the following research questions: 1) what types of intraorganizational social networks and social network constructs are being measured in relation to a healthy workplace, 2) how are intraorganizational social networks influencing workplace health, and 3) how are additional factors (e.g., demographic characteristics) impacting the effects of intraorganizational social networks on

workplace health? The results from 50 articles were synthesized and identified that the majority of articles (40) from different types of organizations looked at the associations between different aspects of workplace social networks and employees' social health outcomes (e.g., support, power), with some articles (10) examining their association with mental health outcomes (e.g., affect), and there were two articles that examined an aspect of physical health but no articles were examined personal health outcomes (e.g., musculoskeletal pain) or chronic health conditions (e.g., hypertension). Included in the future research recommendations was to examine how employees' social network ties were connected with common physical and mental health conditions, such as high blood pressure, heart attack, diabetes, pain, fatigue, stress, or depression. The programmatic recommendations included providing employees with the opportunity to progressively form authentic relationships with each other over time.

The fourth chapter outlined the methods and analyses for the original empirical quantitative study designed to help address the gap in literature identified through the systematic review. Adult healthcare employees were surveyed electronically about their workplace social networks, job stress, burnout, and physical health. A moderation model was used to explore the following hypothesis: *workplace interpersonal relationships will change the association between job stress and employees' health (burnout, physical health).*

Chapter five reported the results of the original empirical study and provided recommendations for future research. Results showed that friendly work-related communication and hostile or difficult communication changed the association between job stress and employees' health outcomes (i.e., burnout, role limitations, and general health). Employees' reported less burnout and fewer role limitations in situations with low stress when they had more frequent friendly work-related communication. Additionally, employees reported higher burnout

and worse general health in situations of high job stress, when they had more frequent hostile or difficult communication. Responses to short answer questions offered additional insights into the types of topics discussed during these conversations. Based on these results, chapter six included (a) contributions to science from the original empirical study, (b) recommendations for how to advance national movements for improving employees' health and wellbeing including the Quadruple Aim, and (c) recommendations for identifying and helping at-risk populations in the healthcare workforce.

Conclusion

The purpose of this dissertation is to increase the scientific understanding about how workplace interpersonal relationships are associated with employees' job stress, burnout, and physical health. The goal of this research is to help organizations successfully achieve the Quadruple Aim, attending to population health, patients' experience of care, per capita cost for healthcare, and employees' health and wellbeing.

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CHAPTER 2: LITERATURE REVIEW

With the goal of optimizing its performance, the health care field has widely accepted the Triple Aim, which called on healthcare organizations to provide high quality, accessible care by attending to 1) population health, 2) patients' experience of care, and 3) per capita cost for healthcare (Institute of Healthcare Improvement, 2018). Unfortunately, researchers are showing that healthcare organizations are encountering substantial barriers that inhibits achieving these three aims. Among the barriers is the deteriorating health of its employees (e.g., burnout, stress; Salvagioni et al., 2017; Seiji Hayashi & McDonnell, 2009) whose health conditions tend to carry over to negatively impact healthcare organizations (Anagnostopoulos et al., 2012; Salvagioni et al., 2017). Efforts to achieve the Triple Aim (i.e., improved outcomes, better patient experience of care, more affordable) can be compromised by employees' poor health because it tends to be associated with being distracted (Salvagioni et al., 2017), absent (Borritz, Rugulies, Christensen, Villadsen, & Kistensen; 2006), less empathetic (Halbesleben, & Rathert, 2008), and more costly to the organization through increased insurance costs (Burton, 2014), medical errors (Shanafelt et al., 2010), or higher rates of turnover (Lu & Gursoy, 2016; Jones, 2008). Consequently, expanding from a Triple to Quadruple Aim by including a fourth aim targeted at improving the health and wellbeing of healthcare employees (e.g., providers and staff; Bodenheimer & Sinsky, 2017; Dyrbye et al., 2017; Feeley, 2017) holds great potential to be an effective approach to optimizing the performance of health care.

One way to improve employees' wellbeing and health (i.e., the fourth aim) is to target workplace health, defined by the World Health Organization (WHO) as holistic health or "a state of complete physical, mental, and social well-being, and not merely the absence of disease" (Burton, 2014, p. 15). In its 2014 report on healthy organizations, the WHO found that

organizations in the US tend to focus on enhancing physical workplace safety (e.g., physical safety hazards at work), improving employees' personal health (e.g., reducing chronic health conditions), and changing employees' lifestyle habits (e.g., physical inactivity, healthy eating; Burton, 2014). Focusing on these three aspects of workplace health leaves out the psychosocial work environment, defined as "the social and contextual aspects of work that have the potential to cause psychological and physical harm" (Leka & Jain, 2010, p. 4). There is evidence that the psychosocial work environment is directly associated, indirectly associated, and tends to interact with other factors in the workplace to promote or harm workplace health (e.g., job demands and depression, job demands and job satisfaction; Leka & Jain, 2010); therefore, it should be considered an integral part of promoting employee health. US organizations can strive to take the holistic approach recommended by WHO if intervention in the psychosocial work environment can be included in their current approach (i.e., targeting physical workplace safety, lifestyle habits, and personal health). A specific aspect of the psychosocial work environment, workplace interpersonal relationships, might be effective at promoting workplace health. Furthermore, taking a social network perspective on workplace interpersonal relationships may offer an innovative conceptualization and methodology. Social networks offer information from the individual, dyadic, and network levels, which may provide a greater depth of understanding about how social relationships stand to promote or exacerbate job stressors.

Based on empirical evidence, there are a variety of factors about working in health care that appear to contribute to poorer health, including overcommitment to work (Hodgkin, Paul, & Warburton, 2017), workload (Leijten et al., 2015; Kuo et al., 2015), job demands (Pohling, Buruck, Jungbauer, & Leiter, 2016; Rodwell, Demir, & Flower, 2013), perceived lack of support from supervisor or coworkers (Paquet et al 2013; Rodwell, Demir, & Flower, 2013), job stress

(Ito et al., 2014), and an imbalance between efforts put forth and rewards (Hodgkin, Paul, &
Warburton, 2017; Pohling, Buruck, Jungbauer, & Leiter, 2016). See Figure 1 for a visual on the
importance of workplace health in the context of the Triple and Quadruple Aim for the success
of a healthcare organization. These factors of poorer health have been associated with two
particularly concerning workplace health outcomes: burnout (Perlo, Balik, Swensen, Landsman,
& Feeley, 2017) and physical health (CDC, 2015). The purpose of this literature review is to (a)
examine the current literature on burnout, physical health, and workplace interpersonal
relationships research (see Figure 2), (b) introduce social network theory, (c) describe how social
network theory can be used to enhance the scientific understanding regarding the associations
amongst employees' workplace interpersonal relationships, burnout, and physical health, and (d)
apply a social network theory framework to future research and practice regarding the use of
workplace interpersonal relationships for the prevention and intervention of burnout and physical
health for healthcare employees.

Burnout and Physical Health

Burnout was described by the Institute of Healthcare Improvement as an "epidemic" for
the overall healthcare field (Perlo, Balik, Swensen, Landsman, & Feeley, 2017, p. 5). A recent
Mayo Clinic survey (2015) found 54.4% of physicians reported experiencing burnout, which was
a nearly 10% increase in burnout from the last survey in 2011 (45.5%) and markedly higher than
the general non-healthcare population (28.8%; Shanafelt et al., 2015). Burnout is associated with
a variety of comorbid psychosocial issues (e.g., secondary traumatic stress; Shoji et al., 2015)
and tends to negatively impact occupational outcomes (e.g., job satisfaction, job demands,
absenteeism, presenteeism). Borritz, Rugulies, Christensen, Villadsen, and Kistensen (2006)
identified evidence that higher levels of burnout are associated with sick days and prolonged

periods of absence due to sickness. Furthermore, employees' physical health, the second area

that is of concern to employers, is also impacted by burnout. Through a systematic review,

Salvagioni and colleagues (2017) identified burnout as a correlate with a variety of physical

health conditions, including Type 2 Diabetes, high body mass index, hypertension, heart disease,

fatigue, pain, headaches, and early mortality. In fact, the combined costs of work-related injury

and illness are equal to about four percent of the world gross domestic product (~ $20.18 billion;

CDC, 2015; Statista, 2018), which means chronic health conditions can increase the cost of

health care because they are costly to the organizations. For example, employees' high blood

pressure, heart attack, diabetes, and pain are four of the ten most expensive chronic health

conditions for organizations (CDC, 2015). Workplace interpersonal relationships are one aspect

of the psychosocial work environment that hold promise in its ability to prevent and intervene in

worsening trends of burnout and physical health.

Workplace Interpersonal Relationships

Researchers have identified that workplace interpersonal relationships can be both a

direct and indirect protective factor to employees' health, depending on the type of relationship

dynamic (see Figure 3). In their review, Methot and colleagues (2017) identified that employees

form types of relationships (i.e., positive, negative, ambivalent, and indifferent) that can

differentially influence employees' health. Employees with strong, positive social relationships

tend to report better health (Kelsey et al., 2000) and when work environments are characterized

by trusting and open relationships employees report better performance at work (Merrill et al.,

2013). Consequently, positive interpersonal relationships likely serve as a protective factor to

employees' physical health and burnout; but, research drawing the connection to the specific

outcomes from interpersonal relationships to physical health and burnout is not abundant. The

following sections provide a brief description of evidence that links interpersonal relationships

with physical health and burnout.

Physical Health

In non-healthcare samples, there is evidence that interpersonal relationships have a

positive effect on physical health. Through a meta-analysis, Holt-Lunstad and colleagues found

that stronger social relationships increased people's odds for survival (i.e., decreased risk of early

mortality) regardless of age, sex, initial health status, follow-up period, or cause of death (2010).

Interestingly, these results were primarily based on naturally occurring relationships, which

could include workplace relationships, rather than service-based or hired personnel. Oksanen and

colleagues' results corroborated the previous finding because it showed that a one unit increase

in social capital (i.e., social resources) was associated with a 19% decrease in risk for all-cause

mortality (2011). Additionally, Ljungblad, Granström, Dellve, and Ålkerlind (2014) found that

employers with better leadership styles (i.e., supportive, developmental leadership) had

employees who reported better health and fewer absences due to sickness. Kouvonen et al.

(2008) found employees were more likely to quit smoking when they worked in socially

supportive work environments with accepting, kind, and trusting interpersonal relationships.

Rydsted, Head, Stansfeld, and Woodley-Jones (2012) showed that employees tended to perceive

their health better when they had high quality social relationships at work compared to

intermediate or low quality (i.e., rated by self-reports of 'never' to 'often' bullied, treated

unfairly, have strained relationships, etc.). The same trend (i.e., positive social relationships is

related to better health) tends to also be true for burnout.

Burnout

In general, researchers find that positive workplace interpersonal relationships are identified by employees as one way that they prevent burnout and one way in which they cope with burnout. Charoensukmongkol, Moqbel, and Gutierrez-Wirsching (2016) found, in non-healthcare employees, that coworker support was negatively associated with emotional exhaustion and depersonalization but unrelated to perceived lack of personal accomplishment. Healthcare workers in rural Ethiopia also reported seeking support from colleagues as a coping strategy for prolonged job stress to help protect against burnout (Selamu, Thornicroft, Fekdu, & Hanlon, 2017). Additionally, supervisor support (among oncology nurses) was negatively associated with burnout (Charoensukmongkol, Moqbel, & Gutierrez-Wirsching, 2016; Snyder, 2009) who reported relying on social support from coworkers as a way to cope with emotional exhaustion or depersonalization (Davis, Lind, & Sorensen, 2013). Snyder (2009) found that coworker support reduced employees' perceptions of depersonalization. Geuens (2015) provided evidence that midwives working in a healthcare center were less susceptible to burnout when they engaged more cooperatively with coworkers but had an increased risk for emotional exhaustion and depersonalization when they reported higher levels of dominant rather than submissive interpersonal behaviors. In a sample of nurses, Moodie et al. (2014) found interesting associations amongst burnout, engagement, demands, and social support (i.e., with colleagues and supervisors). Highly engaged nurses who were experiencing high work demands were still reporting high levels of burnout when they had low levels of support from colleagues and supervisors, despite indicating having high levels of resources at work and an affinity (i.e., committed, involved) for their workplace.

Furthermore, healthcare employees' satisfaction with their social support tends to be indirectly associated with less burnout because social support is associated with lower levels of job stress (Wright, Banas, Bessarabova, & Bernard, 2010). Based on empirical evidence (Charoensukmongkol, Moqbel, & Gutierrez-Wirsching, 2016; Moodie et al., 2014; Selamu, Thornicroft, Fekdu, & Hanlon, 2017; Snyder, 2009), workplace interpersonal relationships may be an effective way to intervene in or buffer against burnout, if the interpersonal relationships are positive. Current research on healthcare employees' interpersonal relationships, physical health, and burnout can be enhanced by conceptualizing and measuring workplace interpersonal relationships in healthcare settings from a social network perspective. The next sections will (a) provide a brief explanation about the theoretical background of networks and social network theory, (b) describe how social network theory can be used to enhance the scientific understanding regarding the associations amongst employees' workplace interpersonal relationships, burnout, and physical health, and (c) apply a social network theory framework to future research and practice regarding the use of workplace interpersonal relationships for the prevention and intervention of burnout and physical health for healthcare employees.

Theoretical Background on Networks

There is some debate on whether social networks and the measurement of networks are grounded in a specific theory or whether researchers are theorizing about networks (Bogatti & Halgin, 2011; Scott, 2017). Borgatti and Halgin (2011) noted that network theorizing can be approached two different ways: 1) "network theory" which is to study the consequences of network constructs (for example, centrality *predicting* outcomes, such as knowledge sharing behaviors between actors in a network), or 2) "theory of networks" which is the study of why networks are structured in particular ways (for example, *explaining* who is connected and *why*

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the connections are laid out in particular structures; Borgatti & Halgin, 2011; p. 1168). These two processes are actually occurring simultaneously, termed *network theory of networks* (e.g., "I hang out with people who share my ideas; but by virtue of hanging out with them, my ideas become more and more like their ideas;" Borgatti & Halgin, 2011; Kadushin, 2012, p.10). Yet, it can be useful for a researcher to punctuate one's focus on either network theory or theorizing about networks. This theory can be defined as network theory because it is examining how social networks are associated with outcomes (i.e., employees' burnout and physical health). Instead of using the term 'network,' however, the term 'social network' is used to highlight the explicit focus on social relationships. As networks can be constructed with many different entities (e.g., non-human animals, organizations, computers, electrical power grids), it is important to make the distinction that the network being studied is a social network; thus, this paper utilizes the term social network theory.

Social Network Theory

Social networks are defined as the sets of connections at work that exist (or do not exist) between actors (e.g., see Figure 4: employees A, B, C, D, E, F, G, H) within a particular system (e.g., organization, geographic region; Tasselli, 2014). While this paper does not focus on the *why* people interact (i.e., theory of networks), it is important to have a basic understanding about how social networks come together in order to discuss how/if they exert effects on employees' burnout and physical health. The social network itself is defined by (a) the propositions that guide the formation of the social network, (b) how researchers choose to define the boundaries, actors, and links (or ties) between the actors, and (c) the social network constructs built from the interpersonal patterns of ties. See Table 1 for definitions of social network constructs.

Social network propositions. Similar to the general understanding of interpersonal relationships (Methot et al., 2017), social network theory proposes that multiple types of relationships exist within a group of people that are characterized by positive and negative sentiments as people interact over time (Kadushin, 2012). It theorizes that a feedback loop is created: interactions shape sentiments which go on to influence the next set of interactions that lead to new sentiments and so on. This type of feedback loop occurs within both the formal (i.e., when ties are designated by official titles or roles) and informal social networks (i.e., when ties are designated by unofficial ties or roles; Kadushin, 2012). For health care, employees have designated job titles and roles with the treatment team, which creates the formal social network. But, social network theory states that, within the formal social network there will also be informal social networks formed between actors (e.g., friendships). Thus, as people interact and form opinions, attitudes, and/or feelings toward other people, clusters or cliques will take shape within the formal and informal social network because individuals tend to identify with or select groups of people with whom they prefer to interact. For example, Figure 4 demonstrates that employees A, B, C, and D have formed a clique or cluster that is only connected to employee cluster F, G, and H through employee E. According to social network theory, a feedback loop of interactions and sentiments has led to denser connections amongst employee groups (1) A, B, C, and D and (2) F, G, and H, which will hold consequences for the actors themselves as well as the entire social network. To explore how the interactions and sentiments of employees influence their health (i.e., burnout, physical health) researchers need to define the social network's boundaries, actors, and ties.

Defining boundaries, actors, and ties. The boundary around a social network is defined by the researcher and research question(s). For example, a whole social network could be defined as an entire healthcare organization despite it having multiple separate buildings. Or, a researcher could be interested in just one of the healthcare buildings, thus, defining the whole social network as within that one building. The two previous examples define their social network through a closed system, but social networks can also be defined by an open system. That is, the social network might be defined by a clear, formal boundary of a closed system (e.g., people employed by a company) or they could have a less defined boundary of an open system (Kadushin, 2012), such as employees who work in a general professional field (e.g., engineering, health care, etc.). Social network theory would posit that both social networks likely influence employees' health because they capture how employees are socially connected; therefore, it is the researcher's decision to designate who (i.e., actor) and what type of relationship (i.e., link or tie) is being studied.

Social networks are also defined by the actors (i.e., who or what is being surveyed) and links (i.e., the type of ties between actors; Kadushin, 2012). Social networks are unique networks to study because they include invisible components that exist on the individual level of analysis (e.g., people's personality, affect) that influence how actors interact to shape larger social network structure (Kadushin, 2012). Therefore, it is important to define what type of relationship (i.e., link) is being measured because researchers will want to consider how actors' individual level traits, affect, or behaviors will impact the subsequent social network structure (i.e., dyadic and network level constructs). For example, Pradhan Shah (2000) found that employees had a negative emotional reaction in response to the dismissal of their friends during a layoff, which could carry over to impact employees' physical, mental, and social health because of the

negative sentiment formed from that event. However, if researchers asked about the dismissal of coworkers that were difficult to work with, then the association might have changed due to an increase in positive affect or a reduction in negative affect (Nonino, 2013). In this example, the type of tie (friend or difficult coworker) mattered for the outcome of interest. Social network theory states that the actors and ties in the social network can be measured to examine if they hold consequences for employees' burnout and physical health.

In all cases, the reports from actors about how they are connected to others will form a pattern that is analyzed to place them into their unique positions within the social network and actors' positions within their social networks constantly adjusts within the larger social network as new information or feedback is exchanged between actors. For example, in Figure 4, employee A endorsed being socially connected to employees B, C, and D, but not E, F, G, or H; however, the social network structure would change if employee A suddenly became connected with employee H. These interactions amongst actors and subsequent patterns mutually interact to build other social network constructs. According to social network theory, employees' burnout and physical health will be associated with the dynamic structure of social networks as well as the social network constructs embedded within the larger structure.

Social network constructs. According to social network theory, actors are impacted by the distribution of ties across the larger social network structure (Kadushin, 2012). The most basic form of distribution is the number of *dyadic* and *triadic ties* in the social network (i.e., measured on the dyadic level). Previous research identified that dyadic network ties tend to affect employees' mental health (e.g., affect, adjustment, perceptions of psychological safety, perceptions of victimization in the workplace; Lamertz & Aqunio, 2004; Liu & Shaffer, 2005; Nonino, 2013; Pradhan Shah, 2000; Schulte et al., 2012; Totterdell, Wall, Holman, Diamond, &

Epitropaki, 2004) and social health (e.g., perceptions of justice; Lamertz, 2002). In Figure 4, dyadic ties (e.g., A—B, D—E, or B—D) and triadic ties (e.g., F—G—H—F) are seen throughout the social network. The pattern of these dyadic and triadic ties can be used to calculate other forms of social network distribution, including: 1) *density*, 2) *structural holes*, 3) *centrality*, 4) *distance*, 5) *network size*, 6) *the "small world," effect* and 7) *multiplexity* (see Table 1 for definitions). Social network distribution constructs have previously been linked with outcomes for employees' workplace mental health (anxiety, enthusiasm, negative affect; Pradhan Shahm 2000; Totterdell et al., 2004) and social health (e.g., conflict, helping each other, satisfaction with social relationships, trust; Chung, Park, Moon, & Oh, 2011; Ibarra, 1993; Labianca, Brass, & Grey, 1998; Luo, Cheng, & Zhang 2016; Toegel et al., 2007; Venkataramani, Labianca, & Grosser, 2013).

Empirical evidence shows that social network constructs are indirectly associated with employees' health in non-healthcare employees. Tsang and colleagues (2012) found friendship centrality was indirectly related to less work stress through higher levels of helping behaviors (i.e., organizational citizenship behaviors; Tsang, Chen, Wang, & Tai, 2012). As mentioned earlier, the type of link matters according to social network theory. Holding a central position appears to be no longer helpful to employees when they are centrally located in a social network of colleagues whom they preferred to avoid (i.e., perceived higher levels of victimization Lamertz & Aquino, 2004) nor with whom they have a high level of conflict, anger, tension, or friction (i.e., lower level of job satisfaction; Tsung Jen, 2013). Therefore, it is possible dyadic ties, triadic ties, and social network distribution constructs are also associated with employees' burnout and physical health. For example, in Figure 4, the social network construct centrality might be positively associated with burnout, which would indicate employee D is more likely to

experience higher rates of burnout than employee H because of the higher degree of connectedness. All of these components of social network theory (i.e., propositions, boundaries, actors, links, constructs) are essential to applying social network theory to workplace interpersonal relationships, burnout, and physical health.

Exploring Social Networks, Physical Health, and Burnout

To date, there are no articles that the author is aware of that examined how workplace social networks are associated with employees' physical health and burnout, which limits the ability to know how to utilize social networks to address the Quadruple Aim. One article was identified that described the burnout and support patterns within nurses' social networks (Anderson, 1991). The results showed that nurses tended to seek support from other nurses with similar levels of burnout and nurses experiencing burnout tended to be centrally located in the workplace social network. While this article provides support for homophily, defined as the tendency for people to flock towards those who are similar and to become more similar to with those people whom one spends time, it does not provide evidence that the social network was associated with burnout as an outcome measure. As such, with limited empirical support available, there is a great deal to learn regarding how workplace social networks can be utilized to help healthcare organizations optimize their efforts toward achieving the Quadruple Aim by reducing employees' burnout and improving their physical health. Social network theory can be used to enhance the scientific understanding regarding the associations amongst employees' workplace interpersonal relationships, burnout, and physical health through its methods of measurement and analysis as well as measurements of network properties.

Methods of Measurement and Analysis

One way that social network theory can enhance the efforts of the Quadruple Aim is to utilize its methods of measurement. Variables for workplace interpersonal relationships are often operationalized through individual level measurements that fail to account for multiple perspectives when measuring relationships. Social network theory, however, offers mathematical and computational tools that can converge relational data to calculate individual, dyadic, and network level properties. Since relational data incorporates information from multiple data sources, it holds the potential to increase the validity and reliability of empirical results that connects workplace interpersonal relationships with burnout and physical health. Social network data can be captured through roster or free response survey data that requests information about who one is in contact with, how frequently, and/or their depth of relationship (Scott, 2017). It can also be collected through observation of interactions at work or alternative data sources (e.g., sent/received email communication, electronic health record notes; Scott, 2017). Then, the social network constructs are calculated using the appropriate mathematical or computation tools (see Scott, 2017), which contributes to the construction of the larger social network structure (i.e., network properties).

Measurement of Network Properties

Properties of the network are different than individual perceptions of relationships because they are a network-level measurement rather than an individual's perspective on the social network. It could be that the entire social network's distribution of connections (e.g., centralization: extent to which the overall set of points in the social network are compacted around particular points or sets of points) influences employees' level of burnout and physical health. Additionally, properties of the social network (e.g., density, structural holes, clusters)

could be associated with employees' burnout and physical health, as there are benefits and costs to different social network structures. For example, the presence of clusters (for example, see actors A, B, C, D in Figure 4) has been found to be detrimental because it closes employees off from one another (Nelson, 1989) but structural holes (for example, see actor E's social position in Figure 4) has been found to be helpful (Kadushin, 2012) because they increase the cohesiveness of the social network. New information about how to prevent or intervene in employees' burnout and deteriorating physical health is likely to be gleaned from taking a social network perspective. The following sections will describe the implications for research and practice based on the reviewed literature and social network theory.

Implications for Future Research and Practice

With such an explicit focus on employees' burnout (Perlo et al., 2017) and physical health (Burton, 2014), it is imperative to continue exploring ways to intervene in the rising rates of burnout and poorer health. Using social network theory, researchers can delve deeper into the nuances of social relationships to explore how they are beneficial (Luo, 2005; Schulte, Cohen, & Klein, 2012) or harmful (Tsung Jen, 2013; Venkataramani, Labianca, & Grosser, 2013) for employees. Specifically, social network theory should be used to expand the focus on (a) boundaries around who is being studied, (b) the types of relationships (i.e., links) being explored, and (c) how organizations can use this information to develop prevention and intervention programs.

Boundaries. Future research should use social network theory to expand the understanding about how the configuration of employees impacts their burnout and physical health. Defining social networks as closed systems fits well with the case study methodology because it allows researchers to have a clear understanding about the actors within the social

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network (i.e., closed system), however, using an open boundary could be useful for learning how to assist areas or groups of professionals who are not as well defined. One specific example is examining social networks from the perspective of healthcare professions because some healthcare professions have seen a greater increase in burnout than others. Shanafelt et al (2015) identified, by profession, the changes seen in burnout from 2011 and 2014. Results showed that professionals in Urology, Physical Medicine and Rehabilitation, Family Medicine, Radiology, Orthopedic Surgery, Dermatology, Internal Medicine subspecialties, General Medicine subspecialties, Pathology, Psychiatry, and General Pediatrics reported significant increases in rates of burnout. Furthermore, when cross referenced with their rates of satisfaction with work-life balance, the following professions are most at-risk for burnout (highest to lowest): Urologic Surgery, Family Medicine, Radiology, Orthopedic Surgery, General Internal Medicine, Neurology, Anesthesiology, and Otolaryngology. Amongst physicians, the rates of burnout were higher and satisfaction with work-life balance were much lower than the general population with the trend showing that gaps will continue to worsen in future years (Shanafelt et al., 2015). Given the strong association with burnout and worse physical health (Salvagioni et al., 2017), it is likely these rates of burnout will translate to poorer physical health. Thus, using an open system approach to measure social networks (perhaps with snowball sampling methods), would provide a way to determine how professionals' social connections are related to their burnout and physical health. Future researchers should explore the variety of social influences that could impact employees' health in helpful and harmful ways depending on the type of relationship.

Types of relationships. There are many types of relationship present in a workplace at one time (Geuens et al., 2015). While social support is commonly described as a protective factor to burnout (Davis et al., 2013) and physical health (Rydsted, Head, Stansfeld, & Woodley-Jones,

2012), just focusing on social support fails to gather a complete picture. Researchers should ask questions about supportive relationships as well as about the presence or connections with negative social networks and work-based communication networks. In addition to being tied with people employees find supportive, employees might also be highly connected to coworkers they prefer to avoid because they experience them as difficult or hostile, which could exacerbate symptoms of burnout, job stress, and thus contribute to worse physical health. Future research should consider how the presence of multiple types of social networks in one workplace (e.g., friendship, difficulty, advice) can change how employees' burnout, job stress, and physical health are affected by their social connections. Additionally, exploring the degree to which different types of networks are influenced by each other and when, researchers can provide better information about utilizing social networks to develop effective intervention programs. Currently, it is unclear if or when positive social networks (e.g., supportive or friendship social networks) and negative social networks (e.g., difficult or hostile social networks) outweigh or are more influential than the other.

Work-based communication networks are unique in that they are not necessarily labeled as positive or negative, but likely still exert effects of employees' health (i.e., physical, mental, social health; Burton, 2014). It could be that being highly connected (e.g., measured through number of ties, density, centrality) in a work-based communication social network is linked with offering more professional help to coworkers, which could be beneficial or harmful. Often, being highly connected in a support social network is beneficial because it means an employee is *receiving* more support but that is not the case if one is *offering* more support because it could develop into social burden, defined as responding to the actions of coworkers that elicit support (Yang, Liu, Nauta, Caughlin, & Spector, 2016). Examples of social burden include a coworker

expressing negative emotion in front of (but not directed at) a colleague (e.g., venting about an

encounter with patient), an employee being frequently asked for help from colleagues (Yang et

al., 2016), or frequently being sought for information about patients. Thus, being highly

connected in a support network by providing support may increase job stress, exacerbate feelings

of burnout, and contribute to worse physical health. Future social network research (e.g., through

density, out-degree centrality) should explore how social burden, being highly connected to

coworkers through offering support or information, influences employees' health. The valuable

information gained about workplace interpersonal relationships through social networks can be

used to develop prevention and intervention programs aimed at protecting against burnout and

promoting better physical health.

Workplace programs. Social network analysis can also be useful in determining if a

program was effective at improving relationships or degree of connection post-intervention.

Previously, researchers have successfully used social network analysis to examine the

connectedness of interpersonal relationships and layout of the whole social network before and

after layoffs (Pradhan Shah, 2000) and mergers (Totterdell, Wall, Holman, Diamond, &

Epitropaki, 2004) in relation to employee outcomes (e.g., negative emotional reactions to layoff

off coworkers, work-related affect). Additionally, information about workplace social networks

is useful for organizations to develop programs aimed at enhancing employees' connectedness in

useful ways, such as bridging gaps between workplace cliques or connecting employees who are

experiencing isolation from colleagues, because it highlights areas of social connection,

disconnection, and isolation in the workplace social network. Sias and Cahill (1998) found that

employees working in a variety of organizational settings experienced forming friendships with

coworkers in the following way: coworker/acquaintance → friend → close friend → almost best

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friend. Additionally, Nonino (2013) found that employees were more likely to form friendships as they exchanged more information and advice. Therefore, employees tend to progressively share more personal information and have more intimate interactions over time. More specifically, the interpersonal interactions may begin as neutral (e.g., asking for advice) and then form into relationships based on reciprocity and trust slowly over time.

To help combat burnout, job stress, and thus promote better physical health, organizations can help their employees develop positive social relationships with colleagues through providing opportunities for connection and social embeddedness. A systematic review from Daniels, Watson, and Gedikli (2017) identified the majority of intervention articles aimed at improving the workplace social environments (six out of eight articles) had engaged employees in a shared activity (e.g., dialog groups on team work or how the organization worked). Additionally, another strategy currently utilized by organizations to enhance social connectivity is the employee network group, which is an informal group that has historically been utilized to reduce social isolation for minority employees (e.g., gender, racial, ethnic minority). These network groups are supported by organizations, but it is the informal leaders of the network group that plan a variety of social activities to offer opportunities for employees to connect with others similar to them and provide an opportunity to garner support, information, and resources. There is evidence that network groups can help reduce turnover intentions and increase career optimism for racial minority employees (Friedman & Holtom, 2002; Friedman, 1999), which suggests they might also be useful for improving workplace health through improving social relationships. For more specific implementation recommendations on network groups see Friedman and Holtom (2002).

These types of intervention could be especially useful for populations who are vulnerable to isolation or disconnection, such as rural healthcare employees. With fewer healthcare employees in rural areas compared to urban or suburban areas (Spero & Fraher, 2014) focusing on the geographic region could be more useful than narrowing in on the specific organization because it would offer more people, thus more opportunities, for social connection. Defining the boundary around specific geographic region could be helpful in creating a similarity or common ground for which professionals could connect, such as similar knowledge about historical events, sports teams, recreational activities, or vacation locations as well as similar struggles with patient care, job resources, and job stressors. Future research and practice should explore how connecting healthcare employees to other professionals outside their organization across their geographic region could help foster positive social connections amongst geographically isolated professional groups, thus, help protect against burnout and promote better physical health.

Conclusion

This literature review highlighted how workplace interpersonal relationships are associated with employees' health and how utilizing social network theory in future workplace interpersonal research and practice can be used to enhance the approach to fostering a healthier workforce of healthcare employees. Transitioning to the Quadruple Aim though incorporating strategies to promote positive interpersonal relationships may foster healthier employees and thus enhance the healthcare field's ability to achieve its Triple Aim (i.e., attending to population health, patients' experience of care, and per capita cost for healthcare; Institute of Healthcare Improvement, 2018).

Table 1

Definitions of social network key constructs

Key Constructs	Definitions
Actor	the objects that are being connected within the social network
Balance`	as more people are added to the network beyond the dyad relationship complexity increases to try and establish balance within relationships
Betweenness centrality*	the extent that a person serves as the middle position of the shortest path between two other actors
Bridging position^	actors who connect otherwise disconnected groups, also called brokerage
Brokerage*	the extent to which the focal person occupies the space between other actors who are not connected to each other
Centrality**	a measure that captures the extent to which a person occupies a central position in the network, this is measured as the person level
Centralization^	extent to which the overall set of points in the social network are compacted around particular points or sets of points, this is measured at the network level
Clusters**	subgroups in a network
Degree centrality^	The number of ties that are either directed to the person (in-degree centrality) or the number of ties that are direct by the person (out-degree centrality)
Density**	the extent to which people are connected in a network
Distance`	the pathway in a network that connects two particular people (e.g., interaction distance)
Euclidean distance	the linear distance between two points (pbarrett.net)
Geodesic distance^	the length of the shortest path between two people
Homophily**	the tendency of similar people to form relationships
Links`	the relationship that connects two actors
Multiplexity`	when more than one relationship exists between actors
Mutuality`	relationships are reciprocal in their give and take of information
Network analysis	a term often used in place of social network theory or social network analysis
Network position^	where an actor is located within a network
Network size`	the total number of actors in a given network
Network theory	a term often used in place of social network theory or social network analysis
Peripheral position^	when an actor occupies a non-prominent position in network (i.e., not central)
Propinquity`	people are more alike to those who are geographically close to them
Reciprocity**	the extent to which relationships are bidirectional

Small World`	relatively small distances link a given actor to all other actors in a given network
Social networks*	sets of connections that exist (or do not exist) within a particular system
Social network analysis^	techniques that examine the patterns of social relationships that individuals and groups form with each other
Social network theory	uses social network analysis concepts to model research outcomes as a function of network processes
Structural holes	
Transitivity**	the tendency of individuals who have relationships with the same third person to also have a relationship with each other
Weak ties`	Tends to be a link that is not defined as "close" to the actor and tends to bridge or link two other actors together in a given network

Note. ** Bae, Nikolaeu, Young Seo, & Castner, 2015; `Kadushin, 2012; ^Scott, 2017; *Tasselli, 2014
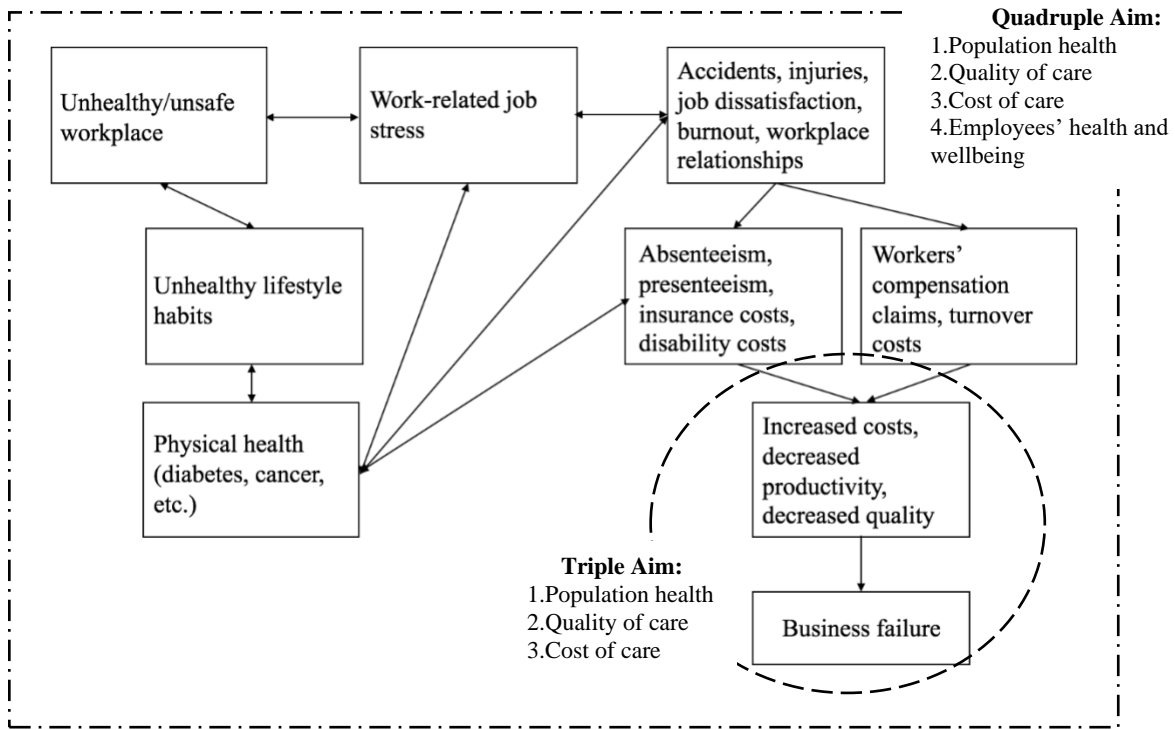
Figure 1. Importance of workplace health within context of Triple and Quadruple Aim; figure modeled after Burton, 2014, p. 6
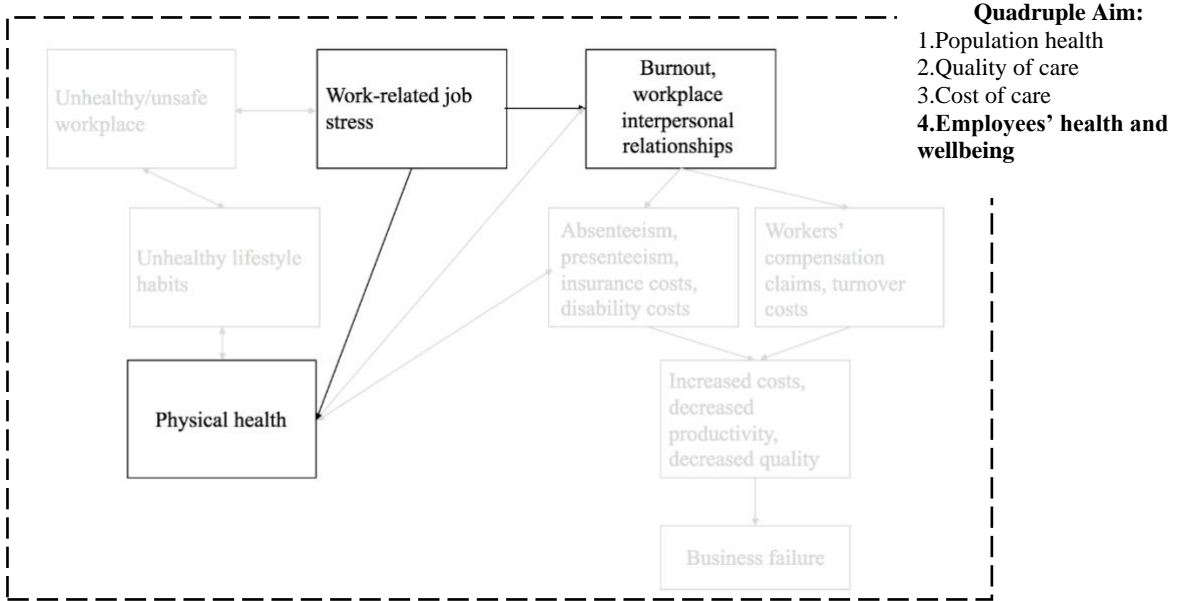
Figure 2. Black/bold font indicates the focus of the current paper within the context of the workplace health and the Quadruple Aim; figure modeled after Burton, 2014, p. 6
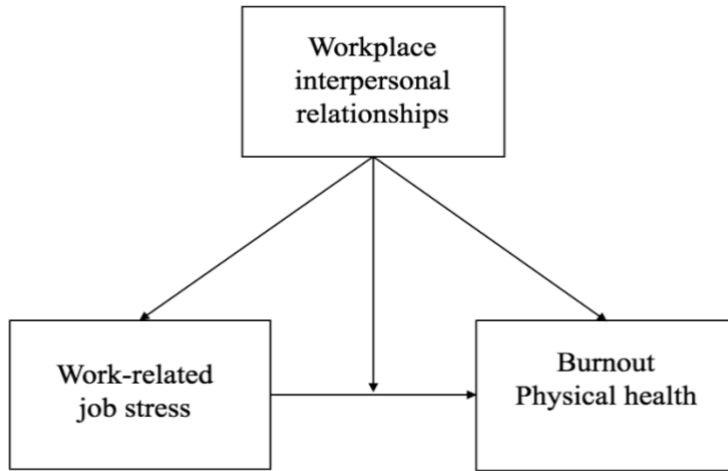
Figure 3. Direct and indirect associations from workplace interpersonal relationships to employees' job stress, burnout, and physical health
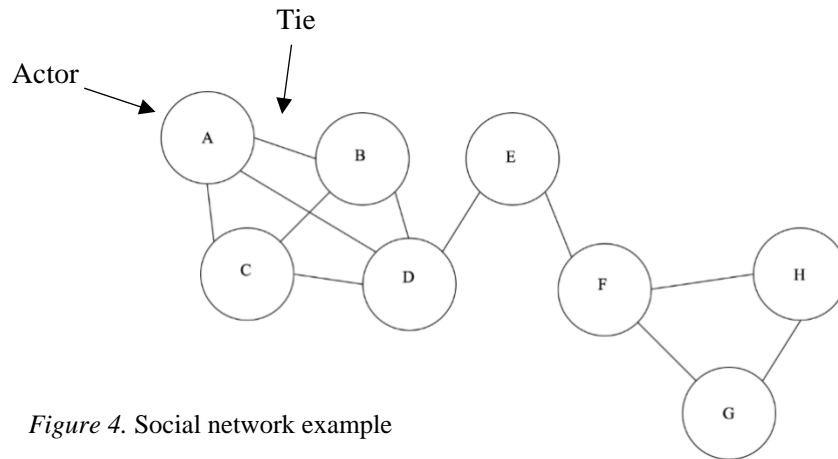
Figure 4. Social network example

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CHAPTER 3: INTRAORGANIZATIONAL SOCIAL NETWORKS AND WORKPLACE

HEALTH:

A SYSTEMATIC REVIEW

However seductive the machine metaphor may be… human organizations are not actually mechanisms and people are not components in them. People have values and feelings, perceptions, opinions, motivations, and biographies, whereas cogs and sprockets do not. An organization is not the physical facilities within which it operates, it is the networks of people in it.
-Sir Ken Robinson, Out of Our Minds: Learning to be Creative

The workplace is killing people and nobody cares, titles a recent article in a movement of

news articles (e.g., *dying for a paycheck* and *the way work is killing us*; Pfeffer, 2018; Schulte,

2018; Walsh, 2018) that underscore the urgency of attending to the psychosocial work

environment as a way to improve the workplace. The psychosocial work environment

encompasses "the social and contextual aspects of work that have the potential to cause

psychological and physical harm" (Leka & Jain, 2010, p. 4), and it has serious implications (e.g.,

increased odds of physical and mental illness and early mortality; Goh, Pfeffer, & Zenios, 2015).

Generally, in the United States (US), organizations have not directly attended to the psychosocial

work environment. Instead, they have primarily taken strides to increase physical workplace

safety (e.g., physical safety hazards at work; Burton, 2014), improve employees' personal health

(e.g., chronic health conditions; Burton, 2014), and change employees' lifestyle habits (e.g.,

physical inactivity, healthy eating; Burton, 2014). These approaches can indirectly benefit the

psychosocial work environment, unfortunately, despite these efforts, employees' disease and

disability rates as well as their associated costs continue to climb. As the health of organizations

and their employees have not improved, it could be that the current indirect efforts are not

enough. Rather, directly attending to the psychosocial work environment can bolster the steps

currently being implemented (i.e., to improve the physical work environment and employees'

personal health) by promoting the holistic approach that is recommended by the World Health Organization.

Workplace Health

A healthy workplace was defined by the World Health Organization (WHO) as "a state of complete physical, mental, and social well-being, and not merely the absence of disease" (Burton, 2014, p. 15). Through creating its framework for a healthy workplace, the WHO noted that its holistic definition follows how most researchers define healthy workplaces (i.e., physical, mental, social functioning). For example, the work environment is associated with employees' physical health (e.g., Type 2 Diabetes, high body mass index, hypertension, heart disease, fatigue, pain, headaches, and early mortality; Salvagioni et al., 2017), mental health (e.g., depression, burnout, insomnia, self-identity, hope, optimism; Clauss et al., 2018; Luyckx et al., 2010; Salvagioni et al., 2017; Shanafelt et al., 2015), and social health (e.g., interpersonal hostility, bullying, intimidation, trust, support; Hutchinson & Jackson, 2013; Kim et al., 2017). The health consequences of unhealthy workplaces highlight the tremendous benefits that employees and organizations stand to reap by fostering a healthy workplace.

Consequences of Unhealthy Workplaces

Unhealthy workplaces hold consequences for health, productivity, and financial costs. Work-based stress is the primary threat to employees' health and the Centers for Disease Control (CDC) noted it is just as risky to health as obesity and physical inactivity (CDC, 2015). A meta-analysis found strong evidence that stress from the workplace was positively related to physical health symptoms in cross sectional and longitudinal studies (Nixon et al., 2011). Employees are more likely to experience sleep problems, dizziness, fatigue, backaches, headaches, eye strain, and gastrointestinal problems (e.g., heart burn, indigestion, nausea) as they experience more

stress from work (Nixon et al., 2011). The WHO found that psychosocial conditions (e.g., stress, fatigue) can lead to distractibility, errors, accidents, and injuries at work (Burton, 2014). The CDC highlighted that employers annually report 4 million nonfatal work-related injuries and illnesses and 55,000 deaths from work-related illnesses, which stands in stark contrast to the 30,000 deaths annually reported due to motor vehicle accidents (CDC, 2015). These types of health consequences carry over to influence productivity and financial costs.

Combined, work-related injury and illness costs are equal to about four percent of the world gross domestic product (~ $20.18 billion; CDC, 2015; Statista, 2018). Employees' high blood pressure, heart attack, diabetes, and pain are four of the ten most expensive chronic health conditions for organizations (CDC, 2015). Each year, presenteeism, or the reduced productivity of an employee due to physical or mental illness (Burton, 2014), is associated with two-thirds of the total expenses due to worker illness (CDC, 2015). Absenteeism, or being physically absent from work due to sickness, is linked with a total financial loss of $228 billion or $1,685 per employee each year for organizations (CDC, 2015). These numbers demonstrate that the work environment has serious consequences for employees and organizations and it is likely these trends will continue to deteriorate without intervention. Alternatively, if the trajectory for healthy work environments and employee health is changed for the better, then employees and organizations stand to benefit through improved health, increased productivity, and reduced financial costs. Attending to the psychosocial work environment will help organizations take a holistic approach to a healthy workplace and thus interrupt the downward trajectory of workplace health.

Psychosocial Work Environment

There are a variety of factors within the psychosocial work environment that influence workplace health (e.g., workload, work pace, job control, career development; Leka & Jain, 2010; Goh et al., 2015), including interpersonal workplace relationships (i.e., relationships with supervisors, subordinates, and colleagues). For example, employees perceive themselves performing better at their jobs when they consider their supervisors as supportive (Merrill et al., 2013), and Quist and colleagues found employees' workgroups tended to cluster around particular health behaviors. Specifically, the results showed that smoking, the amount being smoked, and employees' body mass index was partially accounted for by their workgroups (Quist, Christensen, Carneiro, Hansen, & Bjoner, 2014). Additionally, in general, interpersonal relationships had been found to moderate or change the relationships between other factors in the workplace (e.g., job demands and depression, job demands and job satisfaction; Leka & Jain, 2010). As a result, interpersonal relationships hold the potential to positively influence the work environment through both direct association and by indirectly changing relationships between other workplace factors. Filling in the gaps on interpersonal relationships will benefit organizations and employees through enhancing the understanding about what or when workplace interpersonal relationships are beneficial to fostering healthy workplaces.

Workplace Interpersonal Relationships

Researchers have identified that interpersonal relationships in the workplace can be both protective and risk factors to workplace health, depending on the type of relationship formed. Employees with strong social relationships (i.e., positive relationships) tend to report better health (Kelsey et al., 2000) and employees report better performance at work when they are in environments that are characterized as trusting and open (Merrill et al., 2013). On the other hand,

there can also be a *darker side of groups,* such as the presence of aggression, envy, and scapegoating (Thomas & Hynes, 2007), that can have a negative impact on employees' health, including anxiety, depression, fear, distraction, and increased cynicism toward work (Kim et al., 2017). In a review, Methot and colleagues (2017) identified that employees form different types of relationships (i.e., positive, negative, ambivalent, and indifferent) and that there are different interaction styles within those relationships that lead people to approach or avoid their colleagues. It could be that the benefit of workplace interpersonal relationships is shaped by the type of relationship and interactions that occur within that relationship. Examining interpersonal relationships through a social network lens provides a framework for organizing employees' types of relationships and their interactions at work. This purpose of this paper is to conduct a systematic review of peer reviewed articles that empirically test how intraorganizational social networks influence workplace health by using social network analysis to measure employees' workplace interpersonal relationships.

Background on Social Networks

Social networks are those sets of connections that exist (or do not exist) between actors within a particular system (Tasselli, 2014). Social network analysis maps out connections (i.e., ties) between actors within these networks that enables researchers to identify a variety of social network constructs. Social networks can be examined interpersonally with people as the actors or interorganizationally with organizations as the actors (Carpenter, Li, & Jiang, 2012). This paper focuses on interpersonal social networks within organizations, which can be designated by formal networks organized by official titles or roles and informal networks that are designated by social, emotional, or friendship connections (Scott, 2017). The different social network constructs are important indicators for employees' connectedness at work because they allow

researchers to measure the effects of interpersonal ties. For example, through measuring

employees' social network centrality and density (see Table 1 for definitions) beneficial

information is gained because peripheral employees (i.e., lower level of centrality) or employees

with less dense social networks will have unique aspects to their psychosocial work environment

compared to central employees or employees with dense networks. More specifically, it could be

that peripheral employees or employees with less dense networks might not receive or offer as

much support to coworkers as people who are central to the network or have dense social

networks due to having fewer connections. Less support is important to consider in relation to a

healthy workplace because it is associated with various harmful outcomes, such as early

mortality and worse mental health (Rydstedt, Head, Stansfeld, & Woodley-Jones, 2012). But,

when hypothesizing about social network constructs, it is important that assumptions should not

be made regarding what is healthy versus unhealthy. Network constructs interact with additional

factors, such as demographic characteristics (e.g., gender/sex, age), culture, individual

characteristics (e.g., personality), and organizational context; therefore, it would be valuable to

obtain a broad understanding of what additional variables interact with social network constructs

to influence their effects. There are many important constructs used in social networks in

addition to centrality and density, therefore, a table was constructed for easy viewing (see Table

1).

     Social network analysis offers a rigorous methodology to measure interpersonal

relationships through gathering information about the ties amongst employees. This study will

focus on empirical articles that use social network analysis to measure the interpersonal

relationships within a broad range of organizations or companies (i.e., intraorganizational).

Articles measuring intraorganizational social networks from a variety of organization types are

specifically targeted as a way to maximize the amount of information available to most effectively answer the following research questions, 1) what types of intraorganizational social networks and social network constructs are being measured in relation to a healthy workplace, 2) how are intraorganizational social networks influencing workplace health, and 3) how are additional factors (e.g., demographic characteristics) impacting the effects of intraorganizational social networks on workplace health?

Method

To answer the research questions, a systematic review was conducted on published literature as of December 2017. The researchers followed the seven-step method outlined by Cooper (2017) and the PRISMA flow diagram (Moher, Liberati, Tetzlaff, & Altman, 2009). The first step, *Formulating the Problem*, was used to review how social networks were being used in organizational research (Cooper, 2017) and form the list of inclusion and exclusion criteria (see Table 2). The second step, *Searching the Literature* (Cooper, 2017), was completed through searching the following databases: PsycINFO, ABI/INFORM, PubMed Central, and CINAHL Complete with a set of predetermined terms and filters (see Table 3). Through preliminary searches, it was identified that the literature was inconsistent in whether authors used the specific terms "social network analysis" or "social network theory" within their abstracts or title. As a result, in order to appropriately identify articles that used social network analysis to examine intraorganizational social networks, it was deemed necessary to construct search terms that addressed: 1) the use of social network analysis as the methodology, 2) the organizational setting, and 3) additional social network theory constructs that might have been included in the title or abstract instead of explicitly citing the terms "social network analysis," "social network theory," or "network analysis." The additional social network analysis search terms were

identified through previous systematic reviews about social networks (Bae, Nikolaev, Seo, & Castner, 2015; Chambers, Wilson, Thompon, & Harden, 2012) as well as Kadushin's (2012) theoretical description of social network theory.

In the third and fourth steps, *Gathering Information from Studies* and *Evaluating the Quality of Studies*, respectively, articles were examined for potential inclusion in the review (see details of PRISMA flow diagram in Figure 1; Cooper, 2017; Moher, Liberati, Tetzlaff, & Altman, 2009). Based on the inclusion and exclusion criteria (see Table 2), articles were included or excluded according to the title and abstract. If the reviewers were unable to make a decision based on the title and abstract, the full-text article was examined. All articles were reviewed for inclusion or exclusion by the primary author (ES) and 25% of the articles were also reviewed by two master's-level graduate student reviewers who were trained by the primary author. Comparing the decisions between the primary author and master's-level graduate students served as the reliability check to increase validity and reliability of inclusion/exclusion decisions. To resolve disagreements in inclusion and exclusion decisions, the reviewers discussed the reasoning behind their decisions until they established agreement.

After reviewing the full-text articles, the reference lists of the included articles that measured aspects of workplace health (i.e., physical, mental, social health; Burton, 2014) were examined to identify additional articles that would qualify for the systematic review. The fifth step, *Analyzing and Integrating the Outcomes of Studies* (Cooper, 2017), regarding workplace health (i.e., physical, mental, social health; Burton, 2014) included results that were synthesized to create themes from the content of the included articles. A table that summarizes the characteristics of the studies was created to organize and compare essential information (see

Table 4). The sixth step--*Interpreting the Evidence*, and seventh step--*Presenting the Results* (Cooper, 2017), are detailed below in the results and discussion sections.

Results

The purpose of this systematic review was to understand how the existing empirical evidence on intraorganizational social networks contributes to the understanding of workplace health. The initial search in the four databases (i.e., ABI/INFORM, PsychINFO, PubMed, CINAHL) resulted in 3,463 articles. After duplicates within the databases were removed, there were 3,289 articles and removing duplicates across databases resulted in 3,246 articles. The titles and abstracts of articles were reviewed according to the search criteria, which resulted in the exclusion of 2,895 articles and inclusion of 350 articles for full-text review. From the 350 articles, 34 articles were identified as measuring workplace health outcomes (i.e., physical, mental, social health; Burton, 2014), 98 were excluded because they measured workplace productivity outcomes (e.g., turnover intentions, presenteeism), and an additional 218 were excluded for various reasons (see Figure 1 for the PRISMA diagram with details regarding exclusion reasons). The reference lists of the 34 articles that measured workplace physical, mental, and social health outcomes were reviewed to identify additional relevant articles and 16 additional articles were identified, which resulted in a total of 50 articles for qualitative synthesis. Through *Analyzing and Integrating the Outcomes of Studies, Interpreting the Evidence* and *Presenting the Results* (Cooper, 2017), results from the included articles were synthesized into organized, overarching themes to investigate 1) what types of intraorganizational social networks and social network constructs are being measured in relation to employees, 2) how intraorganizational social network constructs are impacting workplace health, and 3) how

additional factors influence the effects of intraorganizational social network constructs on workplace health. See Table 4 for the characteristics of studies summary table.

Types of Social Networks

Twenty-nine articles (58%) examined more than one type of social network (e.g., friendship and advice; see Table 5 for social network types and frequencies). The types of intraorganizational social networks were grouped into three broad categories: instrumental, expressive-positive, and expressive-negative. Instrumental networks were characterized by interpersonal relationships created through non-personal, work-related ties. Expressive networks were characterized by interpersonal relationships created through personal/emotional, non-work-related ties. Within these different types of social networks, researchers looked at particular social network constructs.

Intraorganizational Social Network Constructs

In the synthesized articles, authors used social network analysis to measure centrality ($n = 23$), dyadic ties ($n = 19$), clusters ($n = 9$), density ($n = 7$), structural equivalence ($n = 6$), distance between employees ($n = 5$), centralization ($n = 2$), Simmelian ties ($n = 2$), network size ($n = 1$), transitivity ($n = 1$), and regular equivalence ($n = 1$). Since articles examined more than one type of social network construct within one study, the sums throughout the results section will not align with summing the number of articles. These 11 social network constructs were empirically examined in relation to workplace health.

Workplace Health Outcomes

Of the 50 articles, 38 articles (76%) examined how social network constructs were related to social health, 8 articles (16%) examined social network constructs in relation to mental health, two articles (0.04%) examined social network constructs in relation to mental and social health

outcomes (i.e., Pradhan Shah, 2000; Totterdell, Wall, Holman, Diamond, & Epitropaki, 2004),

and two articles (0.04%) examined how social network constructs were related to physical

health. See Figure 2 for a map of the associations between social network constructs and

workplace health outcomes that was constructed based on the results from this systematic

review. The next section will describe the findings regarding the relations between

intraorganizational social network constructs and workplace physical, mental, and social health.

Physical health. Two articles examined how employees' intraorganizational social

networks (i.e., density, $n = 2$; centralization, $n = 1$) were related to employees' physical health.

Frank (2015) examined the work groups' density of beliefs for H1N1 vaccinations and staying

home when sick with H1N1 in relation to employees' intentions to receive the H1N1 vaccine or

stay home when sick with H1N1. Zohar and Tenne-Gazit (2008) examined infantry soldiers'

physical safety climate in relation to group centralization and individuals' network density.

Frank (2015) found that the density of health beliefs within the work group did not influence

employees' intended health behaviors but Zohar and Tenne-Gazit (2008) found that friendship

centralization was positively associated, and communication density was negatively associated

with the physical safety climate. There were no articles that examined employees' personal

health outcomes (e.g., hypertension, heart disease, fatigue, pain) or perceived health status.

Mental health. All 10 articles examined a social network construct as the predictor

variable for workplace mental health outcomes (e.g., job satisfaction, satisfaction with social

relationships; Tsung Jen, 2013; Vardman, Amis, Dyson, Wright, & Randolph, 2012;

Venkataramani, Labianca, & Grosser, 2013). Schulte, Cohen, and Klein (2012) also found

support for longitudinal bidirectional effects for employees' perceived psychological safety at

work and dyadic friendship, advice, and avoidance network ties. Nine articles examined an

instrumental social network (e.g., communication, advice), six articles examined an expressive-positive social network (e.g., friendship, support), and two examined an expressive-negative social network in relation to mental health. Of the 10 articles that examined social network constructs in relation to workplace mental health outcomes, seven examined centrality, four examined dyadic ties, three examined structural equivalence, two examined density, two examined clusters with one article for regular equivalence. Two of the articles that examined centrality did not find or failed to find strong empirical evidence for its effects on workplace mental health outcomes (Luo, 2005; Tsang, Chen, & Tai, 2012) and one article found network density was not associated with employee adjustment (Liu & Shaffer, 2005).

Social health. A total of 40 articles examined the relation between intraorganizational social networks and workplace social health. Thirty-two articles examined an instrumental network, 27 articles examined an expressive-positive network, and four articles examined an expressive-negative network. In the various types of social networks, 16 articles examined dyadic ties, 16 examined centrality, seven examined clusters, three examined distance, three examined structural equivalence, three examined multiplexity, two examined density, two examined homophily, two examined Simmelian ties, and one article each that examined centralization, transitivity, and network size. Thirty articles found intraorganizational social network constructs were associated, as the predictor variable, with workplace social health outcomes, including the level of interpersonal similarity or agreement of perceptions amongst employees $(n = 8)$, the support or help employees provided each other $(n = 6)$, how employees perceived their interpersonal relationships at work $(n = 6)$, the level of social influence employees' have with their coworkers $(n = 4)$, and employees' affect $(n = 2)$. Additionally, to address the third research question that asked what additional factors influenced

intraorganizational social network constructs, there were 12 articles that examined intraorganizational social network constructs as the outcomes. In these 12 articles, researchers found that employees' gender ($n = 3$), nationality ($n = 2$), job shift ($n = 2$), personality (i.e., conscientiousness, agreeableness; $n = 1$), conflict ($n = 1$), other social networks or ties ($n = 2$), and loss of coworkers during a merger ($n = 1$) influenced workplace social health. Overall, these articles highlighted the essential role that workplace social networks play in constructing the larger social climate of the workplace. By utilizing the existing social structure, attending to employees' unique characteristics, and encouraging beneficial interpersonal relationship formation amongst coworkers, organizations can strategically build a healthy organizational psychosocial climate.

General Discussion

The current systematic review sought to understand how workplace interpersonal relationships, measured using social network analysis, were associated with workplace health and if there were factors that influenced how intraorganizational social networks affected workplace health. The friendship and advice networks were largely focused on by researchers, offering limited information on the effects of other types of instrumental (e.g., cooperation, access) and expressive (e.g., positive and negative affect, support, avoidance/difficulty) social networks. Additionally, researchers focused heavily on examining employees' dyadic network ties and centrality with fewer studies exploring other types of social network constructs (e.g., Simmelian ties, clusters, density, network size). The articles provided robust empirical evidence that intraorganizational social networks affected workplace social health with only some evidence that intraorganizational social networks affected workplace mental health and very limited or no findings on the effects on workplace physical health. Intraorganizational social

networks were found to be influenced by additional factors, including employees' demographics (e.g., gender, age), nationality, individual factors (e.g., personality), and occupational context (e.g., organizational merger). Future research is needed to quantify the strength of these associations.

It is noteworthy that there were few articles examining the association between intraorganizational social networks and physical and mental health. In fact, no researchers examined how employees' social network ties were connected with common health conditions, such as high blood pressure, heart attack, diabetes, pain, fatigue, stress, or depression. Given the significant need to intervene in the downward trajectory of workplace health and its associated costs (e.g., lost productivity, increased financial costs; CDC, 2015), it is imperative that future researchers empirically test how interpersonal relationships are related to employees' physical and mental health. The current findings on workplace social health can benefit organizations, as workplace social relationships have been directly and indirectly linked to workplace health (Leka & Jain, 2010), however, future research focusing more specifically on when or how employees' interpersonal relationships benefit, buffer, and/or exacerbate workplace physical and mental health should be pursued to provide clearer pathways to the most effective intervention methods for chronic disease, disability, and increased organizational financial costs (e.g. absenteeism, presenteeism, health insurance costs; CDC, 2015).

Practical Implications

The results suggest healthier social dynamics (e.g., less perceived conflict) exist when employees are more socially connected to their coworkers. These relationships can be built over time through repeated exchanges that are not harmful as Sias and Cahill (1998) found that employees working in a variety of organizational settings experienced the forming of friendships

with coworkers in this way: coworker/acquaintance → friend → close friend → almost best friend. These interactions can begin as neutral exchanges (e.g., asking for advice) and occur in such a way that they slowly build relationships based on reciprocity and trust. Over time, these types of interactions lead employees to feel safer in the workplace, which increases their likelihood of building friendships by socializing about non-work-related matters. Encouraging employees to connect with each other also appears to be especially important for bridging workplace social clusters, or cliques, and for employees developing friendships across groups rather than solely within a particular social circle or work group. Organizations can intentionally promote employees forming beneficial social network ties by providing opportunities for connection and social embeddedness.

Strengths and Limitations

One strength of the current study was its focus on social network analysis because it offers a clear methodology to use in the future when measuring employees' interpersonal relationships. Social network analysis offered a unique method for capturing the employees' interpersonal relationships because its method quantified the type of relationship (e.g., friendship or difficulty tie), depth of relationship, and various constructs that resulted from those ties (e.g., centrality, density, clusters). In this way, organizations and researchers can know what types of relationships should be fostered in the workplace to improve workplace health (e.g., friends) and how employees' social network connections or positions influence workplace health (e.g., shared perceptions of workplace psychological safety). For example, particular employees might need additional resources (e.g., support) to maintain their health because they are frequently helping their coworkers or are highly connected to difficult coworkers (i.e., high centrality). Additionally, the review focused on a broad base of articles from a variety of disciplines, such as

health, business, and social sciences, which allowed for the synthesis of a large group of

multidisciplinary, unique perspectives on workplace interpersonal relationships.

It is also important to note research limitations in that this review was constrained by the

date restriction and search criteria. Additional intraorganizational social network articles could

have been published after the cutoff date or in databases not included in this study. Furthermore,

other relevant articles may have been missed given the variability in theories and terms used in

conjunction with social network analysis. Despite these limitations, the included articles

provided useful information on how workplace interpersonal relationships influence workplace

health.

Conclusion

The psychosocial work environment can help interrupt the downward trajectory of

workplace health by capitalizing on employees' workplace interpersonal relationships to promote

a holistic approach to occupational and relational health research and intervention. This

systematic review provided evidence that workplace social connections shape workplace in

helpful and harmful ways. Thus, organizations and researchers can use the outcomes from this

systematic review to help foster a healthier, more productive workforce.

Table 1

Definitions of social network key constructs

Key Constructs	Definitions
Betweenness centrality*	the extent that a person serves as the middle position of the shortest path between two other actors
Bridging position+	actors who connect otherwise disconnected groups, also called brokerage
Brokerage*	the extent to which the focal person occupies the space between other actors who are not connected to each other
Centrality**	a measure that captures the extent to which a person occupies a central position in the network, this is measured as the person level
Centralization^	extent to which the overall set of points in the social network are compacted around particular points or sets of points, this is measured at the network level
Clusters**	subgroups in a network
Degree centrality^	The number of ties that are either directed to the person (in-degree centrality) or the number of ties that are direct by the person (out-degree centrality)
Density**	the extent to which people are connected in a network
Distance	the pathway in a network that connects two particular people (e.g., interaction distance)
Euclidean distance	the linear distance between two points (pbarrett.net)
Geodesic distance^	the length of the shortest path between two people
Homophily**	the tendency of similar people to form relationships
Network analysis	a term often used in place of social network theory or social network analysis
Network position+	where an actor is located within a network
Network theory	a term often used in place of social network theory or social network analysis
Peripheral position+	when an actor occupies a non-prominent position in network (i.e., not central)
Reciprocity**	the extent to which relationships are bidirectional
Social networks*	sets of connections that exist (or do not exist) within a particular system
Social network analysis^	techniques that examine the patterns of social relationships that individuals and groups form with each other
Social network theory+	uses social network analysis concepts to model research outcomes as a function of network processes
Transitivity**	the tendency of individuals who have relationships with the same third person to also have a relationship with each other

Note. ** Bae, Nikolaeu, Young Seo, & Castner, 2015; ^Scott, 2017; *Tasselli, 2014; + Valente

Table 2
Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
• Measured intraorganizational social networks • Used social network analysis/network analysis • Written in English • Published in peer-reviewed journal • Indexed in PsychInfo, ABI/INFORM, PubMed, CINAHL, or listed on references page of included article	• Conceptual articles • Review articles • Commentary articles • Editorials • Conference or Oral presentations • Development of psychometric validation measures • Conducted with nonhuman animals • Using social network analysis with interorganizational samples • Using social network analysis with samples that included subjects external to intraorganizational setting (e.g., patients, family members, community members, academic scholars from different institutions) • Internet social networking or virtual companies

Table 3
Search criteria framework

	Social Network Analysis Search Terms	Organizational Search Terms	Social Network Theory Search Terms K (entered as keywords for all databases)	Filters
PsycINFO	Social network analysisK Social network theoryK Network analysisK	Working conditionsS Organizational BehaviorS Work environmentK WorkplaceK Employee*K	Mutuality Transitivity Egocentric Sociocentric Density "Structural holes" "Weak ties" Popularity Centrality Distance Multiplicity "Interpersonal Environment" Hierarch "Informal ties" "Informal groups" "Informal systems" Rank "Small world"	English language Peer review articles Find all keywords
ABI/INFORM	Social network analysisS Social network theoryK Network analysisK	Organizational BehaviorS Work environmentS Employee*K	Mutuality Transitivity Egocentric Sociocentric Density "Structural holes" "Weak ties" Popularity Centrality Distance Multiplicity "Interpersonal Environment" Hierarch "Informal ties" "Informal groups" "Informal systems" Rank "Small world"	English language Peer review articles Scholarly journals Find all keywords
PubMed	"Social network analysis"K "Social network theory"K "Network analysis"K	WorkplaceM OccupationsM Work environmentK Occupational behaviorK Employee*K	N/A	English language Humans Peer reviewed Find all keywords

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CINAHL	Social networks[M]	Work environment[M]	Mutuality	English
	"Social network analysis"[K]	Occupational behavior[K] Employee*[K]	Transitivity	language
	"Social network theory"[K]		Egocentric	Humans
	"Network analysis"[K]		Sociocentric	Peer reviewed
			Density	Find all
			"Structural holes"	keywords
			"Weak ties"	
			Popularity	
			Centrality	
			Distance	
			Multiplicity	
			"Interpersonal Environment"	
			Hierarch	
			"Informal ties"	
			"Informal groups"	
			"Informal systems"	
			Rank	
			"Small world"	

Note. MESH term[M]; Subject headers; Keyword[K]

Table 4

Summary of characteristics of studies

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
			Physical Health Outcomes		
Frank, 2015 -US	1.Health/social service 2.Education 3.Financial/legal services 4.Arts/entertainment/technology 5.Other (94%)	Age: NR Gender: 39% male, 57% female Race: 46% White, 9% Black, 16% Hispanic, 10% Asian or Pacific Islander, 5% other Tenure: NR	1.Density	1.Work Group	Density of work group support (i.e., higher density indicated greater support) for getting the H1N1 vaccine or staying home when sick with H1N1 was not associated with **intention to get vaccine or to stay home when sick** with H1N1.
Zohar, Tenne-Gazit, 2008 -NR	1.Infantry soldiers (83% with above 70% per platoon)	Age: 18.5 Gender: 100% male Race: NR Tenure:5.57	1.Centralization 2.Density	1.Friendship 2.Communication	Friendship network centralization (i.e., interactions were concentrated to a small number of individuals) was positively associated with the **physical safety climate** and communication network centralization was negatively associated with physical safety climate. Employees' had a safer climate when their friendship interactions were concentrated to a small number of people, but not when they communicated only with a small number of people. Communication density was positively related to transformational leadership and negatively related to platoon size with evidence communication density mediates the relationship between transformational leadership and the physical safety climate.
			Mental Health Outcomes		
Cowardin-Lee, Soyalp, 2011 -US	1.Software company (91-96% per social network type)	Age: NR Gender: 22 male, 10 female Race: NR Tenure: NR	1. Centrality	1.Access 2.Problem solving 3.Tactic knowledge	The authors combined the responses of all three different types of social network to test their hypotheses. Employees' centrality was not related to their **engagement** (i.e., feeling dedicated and vigorously energized at work).

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Johanson, 2000 -Finland	1.Social and health sector organization (74%)	Age: 47 Gender: 87% women Race: NR Tenure: 16	1.Structural equivalence 2.Regular equivalence 3.Density 4.Clusters	1.Advice	Structural and regular equivalence were positively related to democracy of **decision making**. Strength of ties (i.e., direct contact), clique membership (i.e., based on ties), and structural equivalence were positively associated with **rules-based decision making** (i.e., autocratic). Work unit density was positively associated with perceptions of democracy of decision making and negatively associated with perceptions of rules-based decision making. Employees' perceptions of decision making processes was shaped by mechanisms of social influence (i.e., structural equivalence, regular equivalence, density). Social influence (i.e., direct contact, structural and regular equivalence, and clique membership) was not related to **job satisfaction**. Employees' strength of advice ties (i.e., direct contact) was positively associated with **organizational commitment**. Employees with stronger advice ties were more committed to their organization.
Liu, Shaffer, 2005 -China	1.Host country nationals workplace (10.06%)	Age: 43.3 Gender: Majority male Race: NR Tenure: 4	1.Dyadic Ties 2.Density	1.Professional 2.Emotional support 3.Instrumental support	Depth of relationship was positively associated with **adjustment**. Instrumental support ties and contact quality (i.e., cooperative interactions) were not associated with adjustment. Employees' professional network density was not associated with adjustment. Employees were better adjusted when they experienced close relationship with their coworkers but their adjustment was not related to the density of their workplace relationships.
Luo, 2005 -China, Taiwan	1.Technology company (42%) 2.Design and information service company (59%)	Age: NR Gender: 46.3% female in China, 32.8% in Japan Race: NR Tenure: 2.38	1.Centrality	1.Friendship (Guanxi)	Employees' friendship centrality and betweenness centrality in the advice network were positively associated with **particularistic trust** and were not associated with not **general trust**. Employees were more trusting in particular situations when they were more connected to coworkers and connects two other coworkers.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Pradhan Shah, 2000 -NR	1.Consumer electronics firm (93%)	Age: 38.78 Gender: 60% men Race: NR Tenure: 9.71	1.Dyadic Ties 2.Structural equivalence 3. Centrality	1.Friendship 2.Advice	This article includes a mental and social health outcome. Mental health: During a layoff, the dismissal of friends was positively associated with employees' **negative emotional reactions**; the dismissal of a structural equivalent employees (i.e., a coworker who held a similar position in the workplace social network and served the same function) was not associated with negative emotional reactions. Social health: Losing friends during the layoff changed employees' positions in their friendship but the dismissal of structural equivalents did not. Employees with no dismissed of structurally equivalent coworkers experienced less reduction in **friendship centrality** and increased **betweenness centrality** than employees who had one or more structurally equivalent coworker dismissed. Employees who lost many friends during the layoff had high betweenness centrality in the friendship network than employees who lost zero to two friends.
Schulte, Cohen, Klein, 2012 -US	1.Non-military service industry (NR)	Age: 20.89 Gender: 69% female Race: 82% Caucasian, 5% African American, 5% Hispanic, 1% Native American, 4% Other Tenure: NR	1.Dyadic ties	1.Friendship 2.Advice 3.Difficulty	Team members who perceived higher levels of **psychological safety** sent more friendship and advice ties to their teammates than team members who perceived less psychological safety. Team members who sent and received more friendship ties were not more likely than those who sent fewer friendship ties to develop positive perceptions of their team's psychological safety. Team members had more ties to other members who had similar levels of perceived psychological safety. Over time, employees grew more similar to those whom they had friendship ties. Team members who asked for less advice from others formed similar perceptions of psychologically safety over time. The number of advice requests a team member received was positively associated with positive perceptions of psychological safety. The number of difficulty ties was negatively associated with perceived psychological safety and team members who perceived low psychological safety were more likely to have ties to people they identified as difficult compared to members who perceived higher psychological safety. Employees' perceptions of psychological safety reciprocally interacted with their social network ties to shape workplace relationship formation and future perceptions of psychological safety.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Totterdell, Wall, Holman, Diamond, Epitropaki, 2004 -NR	1.Vehicle manufacturer (57%) 2.Industrial fastener manufacturer (79%)	Age: 1)37.08 2)NR Gender: NR Race: NR Tenure: 1)5.49 2)NR	1.Clusters 2. Dyadic ties 3.Structural equivalence 4.Centrality 5.Density	1.Professional	In this article the author studied both mental health (i.e., affect) and social health (i.e., interpersonal similarity in affect). In the first sample, the formation of work groups was related to employees having **similar levels of anxiety and enthusiasm** but not **similar levels of gloominess or calm affect**. Interpersonal ties at work predicted interpersonal similarity in calm affect and anxious affect but not for gloomy or enthusiastic affect. The results suggest that employees' structural equivalence also contributes to their similarity in anxious affect with weaker evidence it contributes to their similarity in enthusiasm. Employees' network centrality was positively related to employees' anxiety and enthusiasm but not related to their calm affect or gloominess. The relationships between employees' centrality and their affect was mediated by their level of influence in the organization only for enthusiasm, not anxiety. As employees become more central to the network they experienced more similarity in enthusiasm partially because they are being influential. Employees' density was negatively associated with their anxiety and gloominess. In the second sample, after a merger, employees who were more central to their networks experienced were less calm, less enthusiastic, and less happy than before the merger. Changes in employees' density was positively associated with changes in their calm affect and happiness while it was negatively associated with changes in their anxiety. A change in social support only mediated the relationship between changes in density and changes in happiness. Having ties to coworkers in other units was associated with employees experiencing smaller reductions in calm affect, enthusiasm, and happiness after the merger than other employees.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Tsung Jen, 2013 -Taiwan	1.R&D divisions (80% or higher)	Age: NR Gender: 85.9% male Race: NR Tenure: 7.58	1.Centrality	1.Relationship conflict 2.Task conflict	Being central to the relationship conflict (i.e., conflict based on feelings of anger or tension) was negatively associated with employees' **job satisfaction** but this association was attenuated for employees who worked closely together. Employees who had conflictual relationships and worked closely together experienced smaller reductions in their job satisfaction than employees who did not work closely together. The relationship between task conflict (i.e., conflict based on work tasks or ideas) centrality and job satisfaction was moderated by task interdependency: a positive association existed between task conflict centrality and job satisfaction when employees do not work closely together and a negative association exists when they do work closely together. Interpersonal conflict in the workplace was detrimental to employees' job satisfaction depending on the origin of the conflict and closeness of working relationships.
Vardaman, Amis, Dyson, Wright, Randolph, 2012 -US	1.Public high schools (95%)	Age: 42 Gender: 66% female Race: NR Tenure: NR	1.Centrality	1.Friendship 2.Advice	Employees' friendship and advice centrality are predictive of perceptions of **job control** partly because of employees' job-related self-efficacy. Employees perceived they had more control over their job as they become more central to their friendship and advice network partially because they believed they could influence their organization.
Venkataram ani, Labianca, Grosser, 2013 -US	1.Food and animal safety product manufacturing (84%) 2.Product development firm (78%)	Age: 1) 38.78 2) 43.5 Gender: 1) 50% female 2) 71% male Race: 87% Caucasian (both) Tenure: 1) 4.10 2)5.27	1.Centrality	Positive: 1.Friendship 2.Advice Negative: 3.Avoidance	Employees' centrality in the positive networks is positively associated **with satisfaction with social relationships** and centrality in negative network was negatively associated with satisfaction with social relationships. Employees centrality in positive network was showed a stronger association with satisfaction in social relationships when they had a higher number of ties in the negative network. Employees were satisfied with their interpersonal relationships at work as they became more connected and when they also reported having people in their workplace that they preferred to avoid at work.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
					Social Health Outcomes
Anderson, 1991 -US	1.Surgical nursing staff in general hospital (95%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Euclidean distance 2.Centrality	1.Social support	Day shift nurses were more likely to seek **support** from other nurses who started working the same time they did, who had similar levels of role ambiguity, and who was experiencing similar levels of burnout and stress. Night shift nurses tended to seek support from other nurses who had the same level of training/credentialing, who had similar levels of satisfaction with work, supervisors, and co-workers, and nurses with high levels burnout were also more likely to seek support from each other. During the day shift, the patient care manager, who provides support to nurses, is **centrally** located in the network. Night shift managers were not centrally located in the network. Nurses experiencing burnout were more likely to be central to the network during the day shift compared to the night shift.
Bae et al., 2017 -US	1.Oncology nurses (37%)	Age: 37.1 Gender: NR Race: 75% Caucasian, 5% other Tenure: 10.05	1.Centrality	1.Mutual support	Nurses perceived that they provided more **support** than they were given credit for from their colleagues. There were no differences between how helpful nurses claimed to be and how helpful they perceived their peers. Day shift nurses received more support than night shift nurses. Nurses with more education received less support and provided less support to peers. Nurses working overtime tended to provide more support to peers. Mutually supporting each other was not predicted by job title, overtime hours, current patient unit, or age
Brass, Burkhardt, 1993 -NR	1.Federal nutrition agency (78%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Centrality	1.Communication	Employees' centrality was not predictive of **power** in the organization when employees' behavioral tactics were entered into the model. Employees' in-degree centrality interacted with the ingratiation and rationality behavioral tactics to be positively related to power; betweenness centrality interacted with upward appeal, exchange, and coalition formation behavioral tactics to be positively related to power; closeness centrality was not related to power. Employees were more powerful in the organization as they became more central to the communication network partially because of how they acted with their coworkers.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Bowler, Brass, 2006 -US	1.Manufacturing firm (81%)	Age: 39.4 Gender: NR Race: NR Tenure: 11.42	1. Dyadic Ties 2.Geodesic distance	1.Friendship	Employees' strength of friendship ties positively predicted **interpersonal citizenship behavior (ICB) performance**. Social dependence (i.e., asymmetric ties) was negatively associated with ICB performance. Strength of friendship ties and third-party influence (geodesic distance or direct/indirect relationships) were positively associated with receiving ICB and social dependence was negatively associated with receiving ICB. Being closer friends to coworkers and being indirectly connected to coworkers through friendship ties was associated with employees' being more helpful to each other. Employees tended to be less helpful when they experienced unreciprocated friendships.
Bowler, Halbesleben, Stodnick, Seevers, Little, 2009 -US	1.Manufacturing firm (81%)	Age: 39.4 Gender: NR Race: NR Tenure: 11.42	1.Centrality	1.Communication	Employees' centrality was not related to **ICB** as a main effect but did interact with impression management motive to predict ICB. At low centrality, there is a positive association between impression management and ICB. At high centrality, there is a negative association between impression management and ICB. Employees motivation to impress their coworkers when they are not central to the communication network.
Brands, Kilduff, 2014 -NR	1.Distributor of electronics (100%)	Age: NR Gender: 16 men, 17 women Race: NR Tenure: NR	1.Brokerage	1.Friendship	Employees perceived men occupied more and were more active in **brokerage** roles than women. Women were perceived to have fewer brokerage opportunities than men and to form fewer friendships than men. Women employees tended to be perceived as not the go-to (i.e., brokerage) person nor as having as many friends as men.
Burkhardt, 1994-US	1.Federal nutrition agency: all 3 time points (53%)	Age: 42.08 Gender: 25% men Race: NR Tenure: 10.18	1.Interaction distance 2.Structural equivalence	1.Communication	Employees of similar age and those who interacted together had **similar technology-related self-efficacy**. Structurally equivalent employees formed more similar technology-related self-efficacy across time. Employees age and position in communication network influenced the similarity of their beliefs.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Chung, Park, Moon, Oh, 2011 -Korea	1.Financial service industry businesses (80% or higher)	Age: 32 Gender: 69.4% men Race: NR Tenure: 5.02	1.Centrality 2.Density 3.Centralization 4.Transitivity	1.Friendship	Employees' centrality, density, and centralization were positively associated with **ICB**. Transitivity was not related to ICB. There were interaction effects such that when centralization was low there was a stronger negative relationship between transitivity and ICB than when centralization was high. Employees who were more central and had denser friendship networks tended to be more helpful. Additionally, employees were more helpful when their interactions were concentrated to a small number of individuals (i.e., centralization).
Fombrun, 1983 -NR	1.R&D of high technology medical instrument corporation (74%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Clusters 2.Centrality	1.Communication	Employees' centrality was positively associated with **administrative power** and **technical power**. Clusters formed based on informal relationships did not help explain attributions of power. Employees gained social influence with their coworkers as they were more central to the communication network.
Frenkel, Sanders, Bednall, 2013 -Australia	1.Financial, hospitality, communications, and beverage firms (100%)	Age: 32.9 Gender: 67 men, 75 women Race: NR Tenure: 4.88	1.Dyadic ties	1.Communication	Employees' perceived frequency of communication between line managers and HR was positively associated with **job satisfaction** when employees perceived their line managers and HR shared common favorable attitudes toward employees.
Gibbons, 2004 -US	1.Public schools (61%)	Age: 43.3 Gender: 50.2% female Race: NR Tenure: 17.8	1.Dyadic Ties	1.Friendship 2.Advice	At time 1, advice ties predict **teaching values** and friendship ties do not. When controlling for time 1 teaching values, employees' friendship ties predicted the change in teaching values at time 2 after an organizational change, but advice ties did not. Results suggest friendships influence employees' values and tend to endure organizational change. Additionally, employees tended to seek advice from coworkers whose values aligned with their own values.
Gilbert, Tang, 1998 -US	1.Federal governmental agency (53%)	Age: 45.77 Gender: 54% female Race: 31% people of color Tenure: 18.4	1.Centrality	1.Friendship	Employees' centrality was not associated with **organizational trust** (i.e., feeling confident in, supported by, and trusting of his/her employer).

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Glaser, Fourné, Elfring, 2015 - Multinational	1.Transport and logistics services company (68.2%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Brokerage	1.Professional	Brokerage, or boundary spanning for top managers was predictive of **role conflict** for middle managers. The number of overlapping ties with employees between top and middle managers was negatively associated with middle managers' role conflict. These results indicated that boundary spanning between different levels of managers (i.e., top and middle) can introduce confusion into the middle manager's role at work but that managers can mitigate this confusion by forming overlapping relationships with employees.
Goodwin, Bowler, Whittington, 2009 -US	1.Social services non-profit (81%)	Age: 40 Gender: 96.7% female Race: 74% Caucasian, 13% Hispanic, 8% African American, 2% Other Tenure: 4.6	1.Centrality	1.Advice network	When leaders perceived themselves to be similar to followers who were central to the network, they reported high leader-member exchange (**LMX; i.e., relationship quality**), but when leaders perceived themselves to be similar to followers who were not central to the network, then they rated those who were similar to them with low LMX. Employee perceived similarity in personality between employee and leader and leader advice centrality was positively related to LMX. Although, at high levels of employee perceived advice network centrality, the relationship between interaction frequency with leader and employee perceived LMX becomes more negative. When employees are less advice network centrality, the relationship between interaction frequency and follower-related LMX becomes more positive. Employees' centrality appears to benefit their relationships with their supervisors, except in cases of high frequency of interactions.
Granitz, Ward, 2001 -NR	1.Head office marketing department (NR)	Age: NR Gender: NR Race: NR Tenure: NR	1.Clusters	1.Professional	Employees had higher levels of **interpersonal similarity in perceptions moral intent and ethical reasoning** to in-group coworkers (i.e., based on department) but were accurate in estimating their similarity in moral intent and ethical reasoning to out-group coworkers. Employees overestimated the level of similarity between themselves and their in-group coworkers.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Ho, Levesque, 2005 -US	1.Computer-related industry firm (84%)	Age: NR Gender: 79% Race: NR Tenure: 1.7	1.Dyadic ties 2.Multiplexity	1.Friendship 2.Advice	Individuals chose advice and friendship ties as **social referents**. Individuals were more likely to choose people who were both friends and friendship structural equivalents, friends and substitutes, and advice givers and friendship structural equivalents as social referents when evaluating organization-wide promises. Individuals went to substitutes when seeking info on one's fulfillment of job related promises but did not go to friends or advice ties. Individuals turned to people who were 1) friends and substitutes, 2) friends and friendship structural equivalents, and 3) advice givers and friendship structural equivalents. **Perceptions of organization-wide promise fulfillment** was similar of friends but not similar for other types of ties or multiplex ties.
Ibarra, 1992 -US	1.Advertising and public relations company (97.5%)	Age: NR Gender: 34 men, 45 women Race: NR Tenure: 4.85	1.Dyadic ties 2.Multiplexity 3.Homophily 4.Centrality	1.Communication 2.Influence 3.Advice 4.Support 5.Friendship	Men held more **ties** to men than women held with women across all five social networks. Women were more tied to men in advice and influence networks; women were tied more equally to men and women in the support and communication network; women were tied to more women in the friendship network. Results showed that men had higher levels of **homophily** in their ties than women. Men and women reported an average of two different types of social network ties per tie. Men had more **multiplex ties** to men than women had to women. Women's strong multiplex ties tended to be women; however, homophily was not related to multiplex ties for men, which suggests men chose a variety of different men different types of relationships. Men tended to be more central to all five networks with the highest difference compared to women in the advice network and the lowest difference compared to women in the friendship network. Results showed sex differences in **centrality** to be explained by employees' rank, department, and tenure. Rank was found to be the strongest predictor of centrality in the advice, support, and communication networks for men and women. Professional activity (i.e., belonging and attending to professional societies) was significant predictor of men's but not women's centrality in the advice and communication networks. Education contributed to men but not women's friendship network centrality. Overall, these results indicate that men's centrality benefitted more from rank, professional activity, and education compared to women. Additionally, for men, having friends with higher status departments increased their network centrality compared to having friends in lower status departments and this effect was not seen for women.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Ibarra, Andrews 1993 -US	1.Advertising and public relations company (97.5%)	Age: NR Gender: NR Race: NR Tenure: 4.85	1.Centrality	1.Friendship 2.Advice	Advice and friendship centrality were not related to perceptions of **interdepartmental conflict** or **job autonomy.**
Krackhardt, 1990 -NR	1.Entrepreneurial computer and technology firm (100%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Centrality	1.Friendship 2.Advice	Employees' friendship centrality was predictive of power and advice centrality is not related to **power**. Advice centrality was highly correlated with formal rank and formal rank was associated with power. Thus, effects of advice centrality are likely being explained by formal rank. Accuracy in perceiving the advice network was predictive of overall power and not correlated with formal rank, which suggests it contributes unique effects on power. No effects were found for accurately perceiving the friendship network. Employees who were more central to the friendship network and could accurately perceive the advice network held more social influence with coworkers.
Krackhardt, Kilduff, 2002 -NR	1.Entrepreneurial computer and technology firm (Site 1: 91%, Site 2: 29%, Site 3: 19%)	Age: NR Gender: 74 men, 31 women Race: NR Tenure: NR	1. Dyadic ties 2.Simmelian ties	1.Friendship 2.Advice	Compared to dyadic ties, employees who were embedded in a Simmelian tie tended to show high agreement in **perceptions of the social structure** (i.e., who was friends with who and who was embedded in a Simmelian tie). Correlations for friendship agreement were higher than those for advice agreement, which suggests workplace culture is more closely tied with friendship rather than advice networks.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Labianca, Brass, Grey, 1998 -US	1.University health center (77%)	Age: 39.4 Gender: NR Race: NR Tenure: 3.5	1.Clusters	1.Communication 2.Interpersonal Affect: friend, acquaintance, don't know the person, or prefer to avoid	Employees' number of friends in an out-group was unrelated to **perceptions of intergroup conflict**. The number of negative ties and acquaintances in an out-group is positively associated with perceptions of inter-group conflict. Employees having third party relationships (i.e., the number of friendships with people involved in the interactions) in the avoidance network was positively related to perceptions of intergroup conflict. Employees number of friendships with people involved in friendships with outgroup members was negatively related to perceptions of intergroup conflict. In-group cohesiveness was negatively associated with perceptions of intergroup conflict. Employees perceptions of intergroup conflict tended to be most influenced by the number of relationships with people they preferred to avoid who were part of the out-group, but the results suggest that having friends who are friends with people in that out-group influence employees to perceive less interpersonal conflict.
Lamertz & Aquino, 2004 -US	1.Bureau of city government (88%)	Age: 39 Gender: 60% women Race: 80% African American Tenure: NR	1.Centrality 2.Structural equivalence	1.Friendship 2.Advice 3.Avoidance	Employees' unreciprocated advice and friendships ties were positively associated with **interpersonal agreement in perception of victimization** at work. Additionally, holding the same formal position (i.e., job title) was associated with agreement in perceptions of victimization at work. Negative relationships between two employees was not associated with them having agreement in perceptions of victimization. Structural equivalence in the advice network was negatively associated with agreement in perceptions of victimization at work. Structural equivalence in the avoidance network was negatively associated with agreement in perceptions of victimization at work. Employees tended to perceive victimization at work similarly when they have experienced similar levels of being targeted for negative or aggressive behaviors from their coworkers (e.g., sabotage, swearing), but their interpersonal similarity in perceptions of victimization was not related to holding similar positions in the social network.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Lin, Lo, 2015 -Taiwan	1.Healthcare center nurses (at least 80%)	Age: 75% under 30 Gender: 99% female Race: NR Tenure: 85% less than 15	1.Density 2.Centrality	1.Professional	Employees' density and valued network density (i.e., peers' assessment of interactions with coworkers who are influential and have important resources) were not related to **sharing knowledge**. Network centrality and valued network centrality (i.e., peers' assessment of who controls information and important resources) were positively related to sharing knowledge. Employees' network density and valued network density were positively associated with **beliefs in interpersonal reciprocity**. Employees who hold more central positions tend to share more with their coworkers and employees with denser social networks and interact more with important coworkers tend to feel more obligated to participate in reciprocity.
Liu, Ipe, 2010 -Taiwan	1.International bank (62%)	Age: 33 Gender: 59% female Race: NR Tenure: NR	1.Centrality	1.Support 2.Advice	Employees' conscientiousness and agreeableness were positively associated with **centrality**. When ICB was added to the model, conscientiousness and agreeableness were no longer predictive of centrality, which suggests centrality is explained more strongly by what employees do rather than personality.
Manev, Stevenson, 2001 - Multinational	1.Global fundraising campaign (74%)	Age: 40.3 Gender: 37% female, 63% male Race: NR Tenure: NR	1.Clusters 2.Homophily 3.Multiplexity	1.Instrumental 2.Expressive	Respondents from different rather than the same nationalities were more likely to form strong **instrumental ties**. Respondents from the same rather than different nationalities were more likely to form **expressive ties**. Employees of different genders were less likely to form strong instrumental or expressive ties. Working in the same country increased the likelihood of forming expressive ties and the results were not clear if it helped employees form instrumental ties. Working in different job functions was negatively associated with employees formation of expressive ties. There is not strong evidence to indicate how working in different job functions influenced employees' instrumental ties. Employees formation of different types of interpersonal relationships was impacted by their nationality, gender, location, and job function.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Nelson, 1989 -NR	1.20 different organizations (n = 90)	Age: NR Gender: NR Race: NR Tenure: NR	1.Dyadic ties 2.Clusters	1.Professional	High conflict companies showed fewer strong **ties** throughout their overall workplace intraorganizational social network than low conflict companies. High conflict companies had more strong internal ties rather than strong external ties amongst employees; low conflict companies had more strong external ties than strong internal ties amongst employees. There were no differences in the number of weak ties between companies with high and low conflict. When companies contained sets of groups employees whom shared many connections with each other (clusters), the absence of an employee group connected the other clusters was associated with **disruptive conflict**. Low conflict companies were represented by structured employee groups that were bound together in an orderly manner of strong ties. Companies tended to have less conflict when their employees were connected with people outside the company and/or when bridges connected the clusters of employees.
Nonino, 2013 -NR	1.Information technology company (89.62%)	Age: NR Gender: 34% women, 66% men Race: NR Tenure: 3.68	1.Dyadic Ties 2.Simmelian Ties	1.Information 2.Access 3.Hindrance 4.Knowledge 5.Advice 6.Communication 7.Positive feeling 8.Negative feeling 9.Friendship 10.Trust	The information and access network were positively associated with **trust, knowledge, advice, positive feeling, negative feeling, friendship, and Simmelian networks**. The hindrance network was negatively associated with all other social networks examined except for the negative feeling network-- that which it was positively associated. Nonino hypothesized that social networks could be group together per social capital structures rather than operate as individual social networks and high correlations amongst the hypothesized social capital structures provided support for this idea; therefore, the type of social networks were predictive of the formation of other types of social networks.
Rank, Tuschke, 2010 -Germany	1.Manufacturing firm 2.Oil refinery (100%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Dyadic Ties	1.Cooperation (composite of information and advice/support) 2.Influence/power 3.Friendship	Employees' perceived influence and friendship ties were positively associated with **cooperative ties**. The presence of friendship ties reduced the strength of the relationship between perceived influence and cooperative ties, which suggested that employees cooperated more as a result of being friends rather than cooperating as a result of power.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Rothstein, Burke, Bristor, 2001 -NR	1.Insurance, packaged goods, and computer industry (80%)	Age: 36 Gender: 55 men, 57 women Race: NR Tenure: 11 years	1.Dyadic ties	1.Support 2.Advice	Men and women both had more **dyadic ties** to men than women at work. Men had more supportive ties to men compared to women and women had more supportive ties to women compared to men. Men and women were more likely to have more than one type of relationship with men than with women. Men were found to receive more support from their same-sex ties than women received from their same sex ties. Men and women received more support from men compared to women. Male and female managers received the same amount of support from men, however, female managers received more support from women than male managers. Authors reported results did not differ by type of support, instrumental (i.e., advice) or expressive (support).
Suzuki, 1998 -US	1.Banks 2.Trading companies (42%)	Age: 35 Gender: 68% male Race: NR Tenure: 3.92	1.Clusters	1.Communication	Overall, **communication patterns** differed when employees were talking to coworkers depending on if they were the same or different nationality (i.e., US or Japan; clusters). Employees who were more likely to engage in task-specific communication with coworkers from different nationalities were either high identification with the US or low identification with Japanese. For employees high in US identification or low in Japanese identification, they also tended to be more socially distant from coworkers from the out-group than employees with low identification of US or high identification of Japan. Japanese and US in-group communication patterns showed they tended to engage in non-tasks related topics. For the Japanese in-group, there was strong evidence that employees were less socially distant compared to their social distance with out-group coworkers. For the US in-group, there was weaker evidence that employees were less socially distant with in-group coworkers than they were with out-group coworkers. For employees high in Japanese identification, their communication patterns tended to not differentiate between types of communication (i.e., task-specific, non-task) for coworkers from the same nationality (i.e., in-group). This pattern was not found for US employees.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Toegel, Anand, Kilduff, 2007 -NR	1.Recruiting agency for job placement (90%)	Age: NR Gender: NR Race: NR Tenure: 2.58	1.Dyadic ties 2.Centrality	1.Friendship 2.Professional	Individuals higher in work and friendship centrality tended to offer more **emotional help to others**. Employees who are high and mid-managers who were high in positive affect offered the most emotional help to employees. The interpersonal emotional support exchanged between colleagues within the workplace tended to occur more with women, when employees had friendship ties with many people, and when employees tended to possess higher managerial responsibility with a high self-monitoring or positive affective disposition.
Tsang, Chen, Wang, Tai, 2012 -NR	1.Nurses in a dialysis department (90%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Centrality	1.Friendship 2.Professional	Employees' professional and friendship centrality were marginally related to **organizational citizenship behaviors** (OCB; i.e., altruism toward colleagues, conscientiousness). OCB was negatively associated with work stress and positively associated with work satisfaction in a path analysis. Employees' professional and friendship centrality indirectly contribute to less work stress and higher levels of work satisfaction because of employees' altruistic actions toward their coworkers; therefore, while employees' OCB carried over to influence employees' work stress and satisfaction, their social network centrality was only associated with the interpersonal interactions between employees.
Umphress, Labianca, Brass, Kass, Scholten, 2003 -Taiwan	1.Financial services company (95%)	Age: 41 Gender: 72% female Race: NR Tenure: 9.9	1.Dyadic ties 2.Network size	1.Advice 2.Communication 3.Workflow 4.Positive feeling 5.Negative feeling	Employees' workgroups, weak expressive ties, and strong positive expressive ties were positively associated with **similarity in perceptions of interactional justice**. The number of employees' communication ties were negatively associated with similarity in perceptions of interactional justice (i.e., perceived fairness of interpersonal treatment from organizational superiors).
Young, 1999 -US	1.Manufacturing and sales of consumer products (75%)	Age: NR Gender: NR Race: NR Tenure: NR	1.Clusters	1.Professional 2.Friendship	**Collective climate** (i.e., groups of individuals who share perceptions of the work environment) was related to employees' interaction groups. Employees' friendships and workflow interactions were not related to collective climate. Rather, collective climate was related to employee interactions resulting from seeking information and making sense of why or how the workplace operates.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Zagenczyk, Gibney, Few, Purvis, 2013 -US	1.Admissions department at public university (67%)	Age: NR Gender: 60.2% female Race:80.6% Caucasian, 11.8% African American, 5.4% Asian, 2.2% other Tenure: 1.94	1.Dyadic ties	1.Friendship 2.Advice 3.Prototype	Employees' weak advice-prototype ties were positively related to employees' **interpersonal similarity in job satisfaction**. Employees' strong friendship ties and friendship-advice were positively associated with **interpersonal similarity in organizational commitment**, but not job satisfaction. Their strong advice ties, strong prototype ties, and strong advice-prototype ties were not related to interpersonal similarity job satisfaction or organizational commitment. Additionally, employees' strong friendship-prototype ties were positively related to interpersonal similarity in job satisfaction but not organizational commitment. Strong friend-advice-prototype ties were positively associated with interpersonal similarity in job satisfaction and organizational commitment. Employees prototype ties were only influential on similarity of employees' perceptions if employees were also connected to their coworkers through advice or friendship relationships.
Zagenczyk, Gibney, Murrell, Boss, 2008 -US	1.Admissions department at public university (67%)	Age: NR Gender: 60.2% female Race:80.6% Caucasian, 11.8% African American, 5.4% Asian, 2.2% other Tenure: 1.94	1.Dyadic ties	1.Friendship 2.Advice	Employees' strong friendship ties, weak friendship ties, and weak advice ties were not predictive of **interpersonal similarity in organizational citizenship behavior** (OCB). Strong advice ties were positively associated with interpersonal similarity in OCB. Employees were altruistic toward coworkers as a result of their advice relationships rather than friendships.

Authors, year -Country	Employee population (% of total social network measured)	Age (year) Gender Race Tenure (years)	Social Network Construct	Type of Social Network	Findings (bold = outcome variable)
Zagenczyk, Scott, Gibney, Murrell, Thatcher, 2010 -US	1.Admissions department at public university (67%) 2. Food and animal safety product manufacturing (84%)	Age: 1) 20.5 2) 38.8 Gender: 1) 60.2% female 2) 51% female Race: 1) 80.6% Caucasian, 11.8% African American, 5.4% Asian, 2.2% other 2) 87% Caucasian, 6.5% African American, 3.2% Hispanic, 3.3% Asian Tenure: 1) 1.94 2) 4.1	1.Dyadic ties 2.Structural equivalence	1.Friendship 2.Advice 3.Professional	In the first sample, employees' advice ties were positively associated with **interpersonal similarity in perceptions of organizational supportiveness**. Employees' structural equivalence in the advice and friendship network was positively associated with interpersonal similarity in perceptions of organizational supportiveness. In the second sample, the same associations were found between dyadic friendship and advice ties and interpersonal similarity in perceived organizational supportiveness. Employees' perceptions of their organizations' level of support was influenced by employees' social relationships.
Zagenczyk, Purvis, Shoss, Scott, Cruz, 2015 -US	1.Computing and information technology company (87.1%)	Age: NR Gender: managers = 78.6% male; team members = 53.2% female Race: managers = 85.7% Caucasian; team members = 82.9% Caucasian Tenure: managers = 16.57; team members = 8.78	1.Dyadic ties	1.Friendship 2.Advice 3.Trust	Employees' number of advice ties characterized by high levels of trust were positively related to **perceptions of their relationships with supervisors** when the supervisors were the same. Employees' number of friendship ties characterized by high levels of trust were negatively related to their trusted friends' perceptions of their relationship with the supervisor when the supervisors were the same. Employees who worked for different supervisors did not have similar perceptions of their relationships with their supervisors. Employees' relationships with their supervisors were the similarly perceived when the employees were connected through advice ties but they were not perceived similarly if the employees were friends.

Note. NR = not reported

Table 5

Types of networks

Network Type		Frequency
Instrumental		
	Advice	22
	Communication	11
	Professional	10
	Information/Cooperation	3
	Influence	2
	Knowledge	2
	Access	2
	Instrumental/instrumental support	2
	Problem solving	1
Expressive- Positive		
	Friendship	26
	Support	7
	Trust	2
	Positive feeling	2
Expressive- Negative		
	Avoidance/difficulty	3
	Negative feeling	2
	Hindrance	1
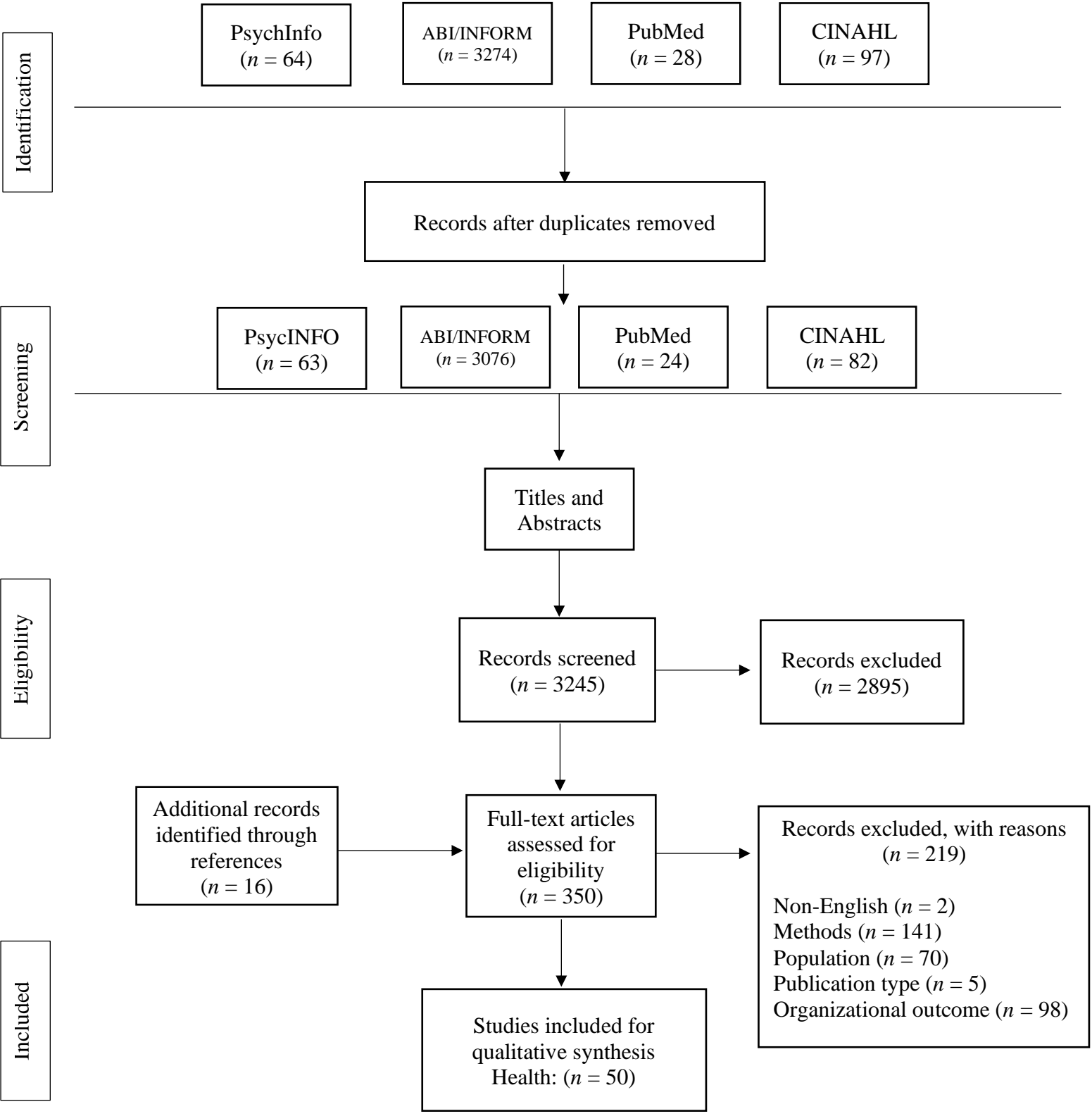
Figure 1. *PRISMA Flow Chart (Moher, Liberati, Tetzlaff, & Altman, 2009)*
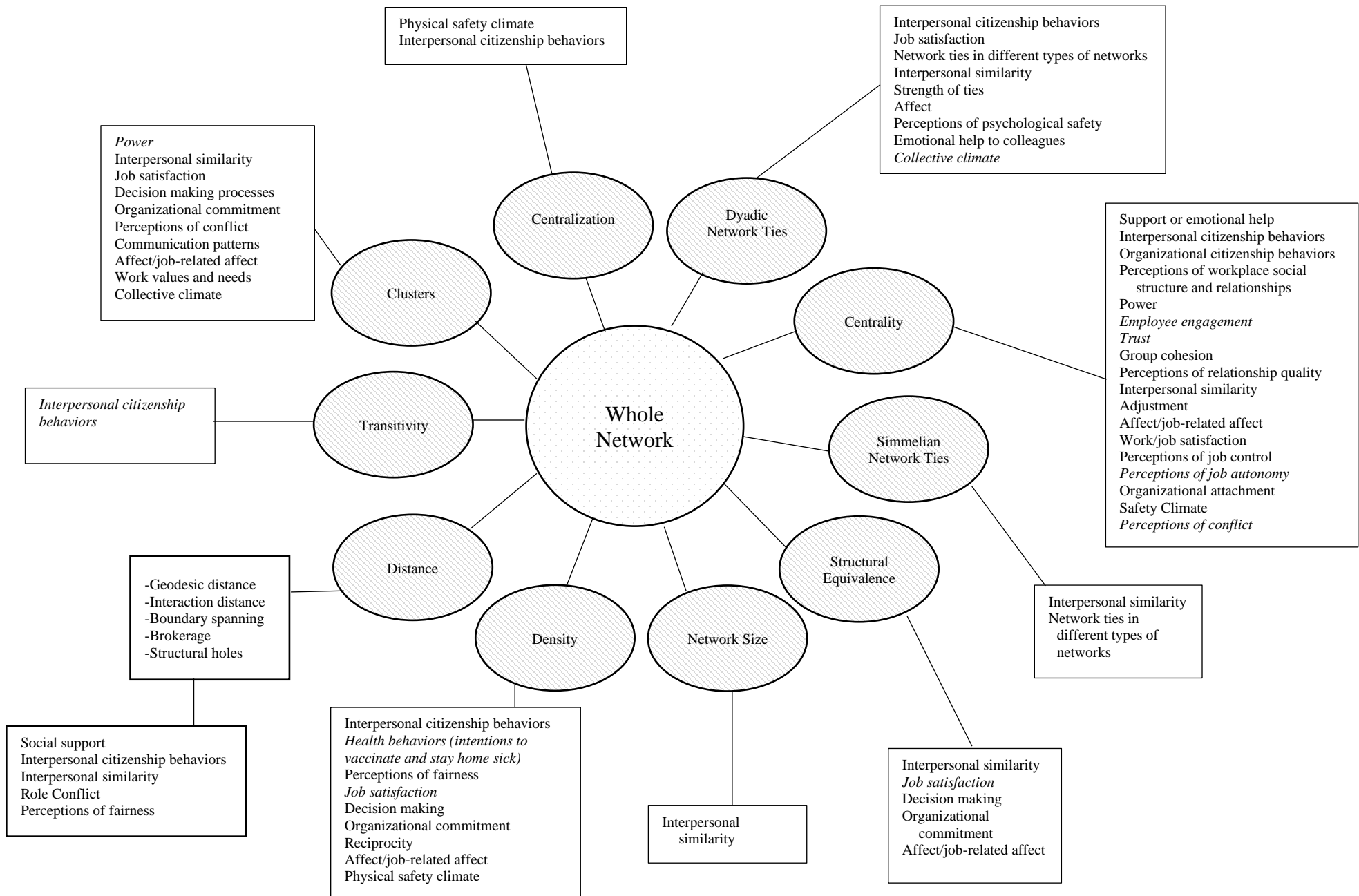
Figure 2. *Associations between social network constructs and workplace health outcomes*
Note. italicized = non-significant association

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CHAPTER 4: METHODOLOGY

In the United States (US), organizations are struggling to manage the rising human and financial costs associated with unhealthy workplace environments. Employees are becoming plagued with a variety of chronic, debilitating physical and mental health conditions (e.g., heart disease, pain, Type II Diabetes, stress, burnout; CDC, 2015; Perlo et al., 2017; Salvagioni et al., 2017; Shanafelt et al., 2015) and these health conditions carry over to negatively impact organizations' finances and performance (Marineau, Labianca, & Kane, 2016) through increased turnover, distractibility, errors, accidents, and injuries at work (Burton, 2014; Salvagioni et al., 2017). To address these costs, organizations should pay attention to workplace health, which is "a state of complete physical, mental, and social well-being, and not merely the absence of disease" (Burton, 2014, p. 15). The purpose of this original research study is to increase the scientific understanding about what factors can be utilized to optimize workplace health.

The World Health Organization (WHO) identified that US organizations have largely focused on improving physical workplace safety (e.g., physical safety hazards at work; Burton, 2014), improving employees' personal health (e.g., reduce rates of obesity and musculoskeletal disorders; Burton, 2014), and attempting to encourage employees' to change their lifestyle habits (e.g., physical activity, nutrition; Burton, 2014). The healthcare sector is one notable exception to that US trend because it has recognized the importance of the psychosocial work environment (Burton, 2014), defined as "the social and contextual aspects of work that have the potential to cause psychological and physical harm" (Leka & Jain, 2010, p. 4). Unfortunately, despite this recognition, healthcare employees' health continues to deteriorate, and the associated costs continue to rise.

A common predictor of poor health in healthcare employees is job stress. An imbalance in their job efforts (i.e., due to circumstances like time pressure, increased workload, and high responsibilities) and perceived rewards can lead to increased risk for heart attacks (Peter, Hammarström, Hallqvist, Siegrist, & Theorell, 2006; Peter, Siegrist, Hallqvist, Reuterwall, & Theorell, 2002), increased psychological strain (Hodgkin, Paul, & Warburton, 2017), a negative impact on blood pressure (Gilbert-Ouimet, Trudel, Brisson, Milot, & Vézina, 2014), and more short-term absences from work (Paquet, Courcy, Lavoie-Tremblay, Gagnon, & Maillet, 2013). In addition to poorer physical health, healthcare employees are also experiencing worse mental health, specifically increased rates of burnout. In fact, burnout in healthcare employees has been labeled an "epidemic" (Perlo, Balik, Swensen, Landsman, & Feeley, 2017, p. 5) and a study by the Mayo Clinic showed that the rate of burnout in physicians rose nearly 10% between 2011 (45.5%) and 2015 (54.4%; Shanafelt et al., 2015), which was substantially higher when compared to the general population (28.8%; Shanafelt et al., 2015). The current study focused on the association between healthcare employees' job stress, workplace health (i.e., burnout, physical health) and social networks, one specific component of the psychosocial work environment.

<div align="center">**Workplace Social Networks**</div>

Workplace social networks (i.e., interpersonal relationships with supervisors, subordinates, and colleagues) are one aspect of the psychosocial work environment that needs to be explored. Specifically, clarification is needed on workplace social networks because there are variety of empirical studies that show interpersonal relationships can be beneficial or detrimental depending on the type of relationship within the social network and depth of relationship (i.e., emotional closeness). Examining social networks in non-health care organizational settings lends

insight into workplace interpersonal relationships. When highly connected to friends, employees in a technology company tended to be more trusting (Luo, 2005) and employees in a non-military service industry perceived the work environment to be more psychologically safe than colleagues who were less connected to friends at work (Schulte, Cohen, & Klein, 2012). On the other hand, communicating frequently with coworkers who were difficult or hostile tended to reduce employees' satisfaction with their jobs in Research and Development divisions (Tsung Jen, 2013) and reduced employees satisfaction with their social environment at work in a food and animal safety product manufacturing company and product development organization (Venkataramani, Labianca, & Grosser, 2013). In healthcare employees, social networks have been examined to in relation to occupational health outcomes, such as how knowledge is shared amongst employees (Scott et al., 2005) and how social networks influence patient care safety (Bae et al., 2015; Bishop & Waring, 2012), but workplace social networks were less frequently associated with workplace health outcomes.

Purpose

The purpose of this study was to examine the associations between healthcare employees' job stress, workplace networks, burnout, and physical health. This dissertation tested the following hypotheses:

1. Job stress is positively associated with burnout and negatively associated with physical health.

2. The association between job stress and health outcomes (burnout, physical health) will be moderated by friendly workplace networks such that the association between job stress and the health outcomes (i.e., burnout, physical health) will change based on frequency of

communication within the friendly work-related and friendly non-work-related workplace networks.

3. The association between job stress and health outcomes (burnout, physical health) will be moderated by hostile or difficult workplace networks such that the association between job stress and the health outcomes (i.e., burnout, physical health) will change based on frequency of communication within the hostile or difficult workplace network.

Study Design

Setting and Participants

The participants were at least 18 years of age and employees at a healthcare organization in North Carolina. To achieve the desired power of 0.80 a sample of 256 participants was collected (calculated using linear multiple regression method, $f_2 = 0.03$, alpha = 0.05, one tested predictor, three total predictors). The sample was recruited from a convenience sample of targeted healthcare organizations per known contacts and professional listservs. See Appendices A-B for recruitment materials. Surveys were sent out electronically. Participants were offered the following incentives to participate: the first 100 participants were entered into raffle for $50 Amazon gift card and all participants were entered into raffle to win one of four $25 Walmart gift cards. Incentives were distributed electronically after completion of the study. All study procedures had university IRB approval (UMCIRB 18-001675; See Appendix C).

Measures

Predictor. *Job stress* was measured using the Effort-Reward Imbalance Short Form (Siegrist et al., 2004). The 16-item scale measured job efforts, job rewards, and overcommitment with four response options (i.e., strongly agree, agree, disagree, strongly disagree). The effort-reward imbalance subscale has been previously found to have acceptable internal reliability (i.e.,

0.87; Hodgkin, Paul, & Warburton, 2017) as well as the overcommitment subscale (i.e., 0.89; Hodgkin, Paul, & Warburton, 2017). An additional qualitative question was included to assess for other issues influencing employees' ability to be physically or mentally present at work.

Moderators. *Workplace networks* was measured through directed, value data collected through sociometric surveys. Participants were asked to mark the frequency of communication they have (i.e., never, rarely, sometimes, often, always) with the types of healthcare disciplines (i.e., Administrative/Leadership, Allied Health Therapist (e.g., Speech, Occupational, Physical Therapies), Case Management, Housekeeping, Mental/Behavioral Health, Nursing, Physician, Secretarial) per the following types of communication: friendly work-related communication (i.e., positive workplace communication network), friendly non work-related communication (i.e., friendships), and hostile or difficult work-related communication (i.e., negative workplace communication network). The response options were scored 0 (never), 1 (rarely), 2 (sometimes), 3 (often), and 4 (always) and the average connectedness score was calculated for each individual.

This method of collecting sociometric data (i.e., at least 15 participants per professional discipline) was chosen rather than the commonly used case study roster method (i.e., per individual) in order to allow measurement of an open system in order to help increase the sample size, optimize power, and enhance the generalizability of the findings. Questions were modeled after a previous social network studies, including Rank & Tuschke (2010) and Kratzer, Leenders, and Van Engelen (2005). Additional qualitative questions were included to assess for topics participants discuss with their colleagues per type of communication (e.g., work-related vs. non-work related).

Outcomes. *Burnout* was measured using the Oldenburg Burnout Inventory (Demerouti Bakker, Nachreiner, & Schaufeli, 2001; Demerouti, Mostert, & Bakker, 2010). The 16-item scale measured disengagement and exhaustion with four response options (strongly agree, agree, disagree, strongly disagree). This burnout measure was chosen instead of the commonly used Maslach Burnout Inventory because it includes both positively and negatively worded questions. Additionally, the Oldenburg Burnout Inventory was chosen because the existing literature showed Cronbach alpha's within the acceptable range when used with behavioral and mental health providers (i.e., 0.81- 0.86; Shoji et al., 2015) and for diverse racial/ethnic minority samples (i.e., above 0.80; Velez et al., 2018).

Physical health was measured with an adapted version of the Rand 36 Health Survey that measures physical functioning, bodily pain, functional limitations due to physical health problems, role limitations due to physical and emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions (Moorer, Suurmeijer, Foets, & Molenaar, 2001). This study used an adapted version with the subscales: physical functioning, bodily pain, role limitations due to physical health problems, and general health perceptions (Moorer, Suurmeijer, Foets, & Molenaar, 2001). The response options varied from dichotomous, 5-point scale, and 6-point scale response options and scores will be calculated per subscale. This measure of health was chosen because it captures perceptions of general health, lifestyle adaptations and role limitations due to health, and physical symptoms. Additionally, based on existing literature, the RAND-36 has fallen into the acceptable range for internal consistency (i.e., 0.78; Boykin et al., 2016).

Control variables. Participant *age*, *sex* (male/female), *race*, *ethnicity*, *job type*, (i.e.,

Nursing, Physician, Allied Health Therapist (e.g., Administrative/Leadership, Allied Health

Therapist (e.g., Speech, Occupational, Physical Therapies), Case Management, Housekeeping,

Mental/Behavioral Health, Nursing, Physician, Secretarial, Other), *job tenure* (years in current

position), *professional tenure* (years in profession), *organizational tenure* (years in employed by

the company), *organizational zip code,* and *size of health care setting* were controlled for, within

the analyses. *Age* has been associated with job stress and health, therefore was important to

control for its. Social networks have shown differential patterns and effects across *gender* (Gray

et al., 2007; Ibarra, 1992, 1993), *job type* (Hämmig & Bauer, 2013)*,* and *tenure* (Lasalvia et al.,

2009), therefore, it was important to control for their effects.

Data Collection and Procedures

A waiver of informed consent explaining the consent process was presented before

requesting survey data from research participants (see Appendix D). The survey contained

questions pertaining to non-identifiable demographic information (race, ethnicity, age, sex, job

tenure, professional tenure, organizational tenure, organizational zip code, job type, size of

health care setting), job stress, burnout, physical health, and workplace networks (See Appendix

E). No identifiable information was contained within the final survey data and surveys were

assigned a participant identification number. The de-identified data was saved into an excel text

file and stored in an encrypted, password protected file on a password protected computer.

To protect against a breach of confidentiality of data, safeguards were put forth, including

the HIPAA compliant REDCap secure server for data collection, de-identified data, encryption,

and password protected files and devices. No breach of confidentiality occurred during the study.

Should a breach of confidentiality occur in the future, East Carolina University's Institutional Review Board and the participant whose confidentiality was breached will be notified.

Statistical Analyses

Multiple imputation was used throughout to handle missing data and the hypotheses were tested using multiple regression in the statistical software R. Moderation was tested by looking at the interaction terms using regression analyses. The interaction terms were computed for the predictor*moderator (X*Z). Each product term was regressed onto the individual terms (X and Z). Each product term was regressed onto the individual terms (X and Z). Dummy variables were used for categorical variables. Jeremy Dawson's website was used for probing interaction effects (Dawson, 2019).

Summary

The lack of evidence on the association between workplace interpersonal relationships and employees' mental and physical health inspired this study. The purpose of this original research study was to examine how workplace interpersonal relationships changed the association between healthcare employees' job stress, burnout, and physical health. The goal of the findings was to help inform future research, policies, and practices on how to foster a healthy, productive workforce of healthcare employees by utilizing workplace interpersonal relationships.
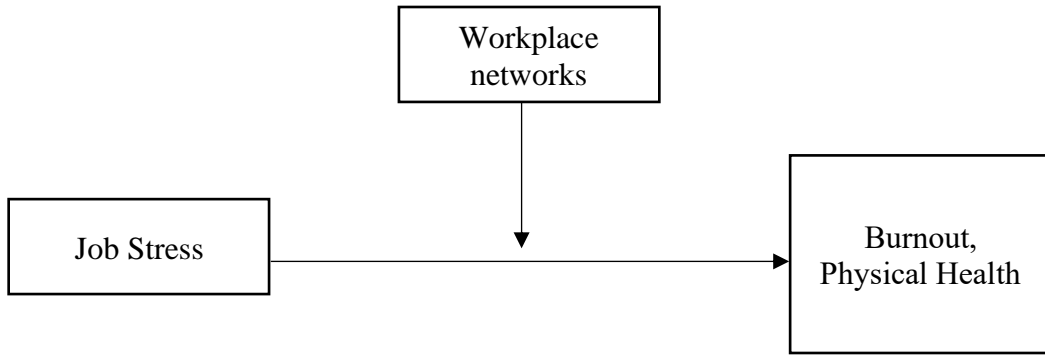
Figure 1. *Hypotheses*

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CHAPTER 5:

THE INTERACTION OF JOB STRESS AND WORKPLACE INTERPERSONAL

RELATIONSHIPS ON HEALTHCARE EMPLOYEES' BURNOUT AND PHYSICAL

HEALTH

Healthcare professionals in the US tend to endorse that their jobs are a significant source of stress due to a variety of different workplace factors, such as insufficient resources, workload, recent changes in organization, and lack of skills development (Haggerty, Field, Selby-Nelson, Foley, & Shrader, 2013; Seiji Hayashi & McDonnell, 2009; Ito et al., 2014; Lasalvia et al., 2009). These job stressors are linked with poor health outcomes, including increased rates of burnout (i.e., emotional exhaustion and depersonalization; Gilbert-Ouimet, Trudel, Brisson, Milot, & Vézina, 2014; Lasalvia et al., 2009) and high rates of physical health issues (e.g., chronic health conditions, bodily pain, perceptions of health; Salvagioni et al., 2017). It is critical to attend to employees' burnout and physical health problems as they often negatively impact quality of patient care (Halbesleben & Rathert, 2008; Scheepers, Boerebach, Arah, Heineman, & Lombarts, 2015) and organizational costs (Han et al., 2019). A missing link in the literature is the role of workplace interpersonal relationships that hold the potential to reduce burnout and improve physical health.

National initiatives are beginning to sense the relevance of attending to provider well-being. The Quadruple Aim proposed as an expansion on the Institute of Healthcare Improvement's Triple Aim framework (i.e., attend to population health, patients' experience of care, and per capita cost for healthcare; Institute of Healthcare Improvement, 2018), by adding an aim focused on preserving healthcare providers' health and wellbeing (Bodenheimer & Sinsky, 2014). The National Academy of Medicine cites clinician well-being as an essential

component to health care, specifically to improve performance and reduce rates of turnover and medical errors (National Academy of Sciences, 2019a). In addition, it also cited team-based health care (i.e., integrated services and collaboration) as a possible intervention to improve clinician wellbeing (Smith et al., 2019). The purpose of this study is to help address the national crisis associated with healthcare employees' health and wellbeing by examining components of team-based care, specifically how job stress and workplace interpersonal relationships are associated with employees' burnout and physical health, using social network theory.

Social Network Theory and Workplace Relationships

According to social network theory, the formation of interpersonal relationships are shaped by different aspects of relationships (e.g., relationship type, closeness, frequency of contact). Employees tend to hold more than one type of relationship within the workplace and these relationships build over time through repeated interactions to create overall positive and negative sentiments toward coworkers (Kadushin, 2012). The effects of workplace interpersonal relationships depend on whether positive or negative sentiments are fostered. For example, supportive interactions build positive sentiments and are often linked with positive outcomes (e.g., better mental health; Rydstedt, Head, Stansfeld, & Woodley-Jones, 2012); hostility fosters negative sentiments and is generally associated with negative outcomes (e.g., lower psychosocial safety; Schulte, Cohen, & Klein, 2012).

Examining workplace interpersonal relationships using social network theory allows researchers to glean a nuanced view of the effects of workplace interpersonal relations. Social network theory provides the means of measuring conditional communication (i.e., when or why are people communicating), information flow (i.e., dissemination of information across healthcare site), collaboration (i.e., discussing patient care), relationship strength (i.e., degree of

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connectedness between people), and disconnection (i.e., degree of disconnection between people; Chambers et al., 2012). With this information about the workplace, policies and workflow procedures can be developed to help protect employees from burnout while improving physical health. The following sections will discuss (a) outcomes associated with burnout and physical health, (b) differential associations of workplace interpersonal relationships with burnout and physical health, (c) the methods of this network design, (d) results from the study pertaining to interaction effects of workplace interpersonal relationships on the association between job stress and health outcomes (i.e., burnout and physical health), and (e) conclude with a discussion of future research regarding how to validate and expand the literature based on workplace interpersonal relationship and employees' health and wellbeing.

Outcomes Associated with Burnout

Burnout has become such a widespread issue in health care that Perlo, Balik, Swensen, Landsman, and Feeley termed it an "epidemic" (2017, p. 5). Shanafelt and colleagues (2015) found that physicians were experiencing burnout in rates markedly higher than the general population and that the rate of burnout (54.4%) had increased nearly 10% since the initial survey in 2011 (45.5%). Burnout affects many different types of healthcare employees: nurses (Davis, Lind, & Sorensen, 2013; Moodie, Dulan, & Burke, 2014), psychiatrists and social workers (Lasalvia et al., 2009), counselors (Shoji et al., 2015), physicians from various specialties (e.g., emergency medicine, urology, family medicine, internal medicine, physical medicine and rehabilitation, etc.; Shanafelt et al., 2015), and medical residents (Prins et al., 2007). With such widespread effects, the negative impact of burnout on organizational costs and employees' health and wellbeing is critical to address. Evidence suggests burnout affects employees' turnover intentions (Davis, Lind, & Sorensen, 2013; Han et al., 2019) and frequency or duration of sick

leave (i.e., prolongs periods of absence due to sickness and sick days; Borritz, Rugulies, Christensen, Villadsen, & Kistensen, 2006; Peterson et al., 2011). At the employee level, burnout not only leaves providers feeling emotionally exhausted, cynical, and disconnected from their work, but it is also linked with various chronic health conditions (e.g., Type 2 Diabetes, high body mass index, hypertension, heart disease, fatigue, pain, headaches; Salvagioni et al., 2017), mental health issues (e.g., secondary traumatic stress; Shoij et al., 2015), and early mortality (Salvagioni et al., 2017). To intervene in this epidemic, it is important to understand determinants and interacting factors, such as workplace interpersonal relationships.

Workplace interpersonal relationships and burnout. Depending on coworker interactions, workplace interpersonal relationships can serve as either risk or protective factors for burnout. The factors of workplace interpersonal relationships that tend to increase rates of burnout include low levels of support and isolation (Eliacin et al., 2018). Moodie et al.'s (2014) results suggested that nurses' low social support exerted detrimental effects on job stress even in the presence of many job resources and affinity for working in health care. When workplace interpersonal relationships are supportive, however, the effects tend to be beneficial. Cunningham and colleagues' systematic review provided evidence that positive workplace social networks buffered nurses from burnout (2012). Additionally, coworker support tends to be negatively associated with components of burnout (Charoensukmongkol, Moqbel, & Gutierrez-Wirsching, 2016; Laschinger, Grau, Finegan, & Wilk, 2010). In fact, Selamu and colleagues showed that employees often cited seeking support from colleagues as a coping strategy to reduce burnout (2017) and Geuens et al. (2015) found that cooperative interactions with coworkers reduced susceptibility to burnout. The same trends in the associations between burnout and outcomes tend to be found for employees' physical health.

Outcomes Associated with Physical Health

When employees are in workplaces with high stress and/or low resources, such as in health care, they are particularly at-risk for poor health outcomes (Khamisa, Oldenburg, Peltzer, & Ilic, 2015). Kuo et al. (2015) found that healthcare professionals were more likely than the general population to experience migraines and Hafner, Milek, and Fikfak (2018) showed that a variety of healthcare professionals (e.g., nurses, midwives, non-health professionals) working in a hospital were particularly at-risk for musculoskeletal disorders (e.g., low back pain).

The impact of physical health issues on the organization is also costly. The combined expenses of work-related injury and illness are equal to about four percent of the world's gross domestic product (~ $20.18 billion; CDC, 2015; Statista, 2018) and high blood pressure, heart attack, diabetes, and pain are four of the ten most expensive chronic health conditions for organizations (CDC, 2015). Additionally, physical limitations tend to contribute to presenteeism (i.e., productivity lost while at work; Merrill et al., 2012) and absenteeism (i.e., absence from work; Hafner, Milek, & Fikfak, 2018). Thus, it is essential to understand the factors of workplace interpersonal relationships that are detrimental and beneficial to employees' physical health.

Workplace interpersonal relationships and physical health. According to social network theory, employees' physical health depends on different aspects of interpersonal relationships and with whom employees surround themselves. The smoking habits of employees tends to change based on their peers' smoking habits (Christakis & Fowler, 2008) and how well the work environment supported smoking cessation (Kouvonen et al., 2008). Additionally, there is evidence that the way employees' deal with difficult situations with coworkers can increase risk for myocardial infarction (i.e., coping with avoidance; Leineweber et al., 2011). On the other hand, employees tended to perceive health better when they had high quality workplace social

relationships compared to intermediate or low quality (Rydsted, Head, Stansfeld, & Woodley-Jones, 2012). Employees' interpersonal relationships tend to be positively linked to physical health outcomes and predictive of physical health outcomes, even when accounting for health behaviors (Dinis, Sousa, de Moura, Viterbo, & Pinto, 2019). Given these disconcerting outcomes of burnout and physical health, an examination of the differential effects of workplace interpersonal relationships is essential to reducing employees' burnout and promoting better physical health.

The Current Study

This cross-sectional study sought to investigate if interdisciplinary interpersonal relationships in the workplace change the association between job stress and employees' health outcomes (i.e., burnout, physical health). The following hypotheses were investigated:

1. Job stress is positively associated with burnout and negatively associated with physical health.

2. The association between job stress and health outcomes (burnout, physical health) will be moderated by friendly workplace networks such that the association between job stress and the health outcomes (i.e., burnout, physical health) will change based on frequency of communication within the friendly work-related and friendly non-work-related workplace networks.

3. The association between job stress and health outcomes (burnout, physical health) will be moderated by hostile or difficult workplace networks such that the association between job stress and the health outcomes (i.e., burnout, physical health) will change based on frequency of communication within the hostile or difficult workplace network.

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<center>**Method**</center>

Data Collection and Procedures

Surveys were sent out electronically, and participants provided informed consent prior to responding to survey items (see Appendix D). The first 100 participants were entered into raffle for one of two $50 Amazon gift cards and all participants were entered into raffle to win one of four $25 Walmart gift cards. Incentives were distributed electronically after completion of the survey. Data were collected and managed using REDCap (Research Electronic Data Capture) an electronic data capture tools hosted at East Carolina University (Harris et al., 2009; Harris et al., 2019). REDCap is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources. No identifiable information was contained within the final survey data and surveys were assigned a participant identification number automatically by REDCap. The de-identified data was saved into an excel text file and stored in an encrypted, password protected file on a password protected computer. To protect against a breach of confidentiality of data safeguards were put forth, including the HIPAA compliant REDCap secure server for data collection, de-identified data, encryption, and password protected files and devices.

The survey contained questions pertaining to non-identifiable demographic information (*race, ethnicity, age, sex, job tenure, professional tenure, organizational tenure, organizational zip code, job type, size of organization*), *job stress*, *burnout*, *physical health*, and *workplace networks* (See Appendix E). Workplace networks were collected through sociometric data of

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communication between professions rather than the commonly used case study roster method (i.e., per individual). This methodology allowed for measurement of an open system in order to help increase the sample size, optimize power, and enhance the generalizability of the findings. Questions were modeled after previous social network studies, including Rank & Tuschke (2010) and Kratzer, Leenders, and Van Engelen (2005). Additional qualitative questions were included to assess for topics participants discuss with their colleagues per type of conversation (i.e., friendly work-related, friendly non-work related, hostile/difficult). All study procedures had university IRB approval (UMCIRB 18-001675; see Appendix C).

Setting and Participants

The sample was recruited from a convenience sample of targeted healthcare organizations per known contacts and professional listservs. Inclusion criteria included: (a) participants at least 18 years of age and (b) employees at a healthcare organization in North Carolina. The sample was limited to North Carolina to control for differences in healthcare policies and procedures. See Appendices A-B for recruitment materials. Consent was collected from 308 participants, but the final sample size was 237. Participants were removed for the following reasons: 10 completed only demographic items, 36 participants worked outside North Carolina, and 25 did not complete any items within the survey. Therefore, the smallest effect size that was detectable with a sample of 237 participants, 3 predictors, and 80% power was $f_2 = 0.03$.

Measures

Predictor. *Job stress* was measured using the Effort-Reward Imbalance Short Form (Siegrist et al., 2004). The 16-item scale measured job efforts, job rewards, and overcommitment with a 4-point Likert scale (i.e., strongly agree, agree, disagree, strongly disagree). The scores ranged from 3 to 12 for the effort scale and 7 to 28 for the rewards scale with higher scores

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indicating greater level of job stress. Sum scores were calculated for the effort scale and reward scale. The overcommitment scale was not used in this study. The measure has previously been used with healthcare samples with internal reliability and consistency falling within the acceptable range (Hodgkin, Paul, & Warburton, 2017).

The imbalance ratio between effort and rewards was calculated using the following equation: $k*$(effort sum/reward sum) where $k = 7/3$ (i.e., number of effort items/number of reward items; Siegrist, Li, & Montano, 2014). Higher numbers indicated greater imbalance between job efforts and rewards, thus higher level of job stress. Using Cronbach's alpha, the reliability of the effort sum scale was 0.72 and 0.55 for the reward sum scale for this sample. An additional qualitative question was included to assess for other issues influencing employees' ability to be physically or mentally present at work.

Moderators. *Workplace networks* was measured through sociometric surveys that collected directed, value data. Participants marked the frequency of communication—on a 5-point Likert scale—they have with types of healthcare disciplines (i.e., Administrative/Leadership, Allied Health Therapist (e.g., Speech, Occupational, Physical Therapies), Case Management, Housekeeping, Mental/Behavioral Health, Nursing, Physician, Secretarial) per the following types of communication: friendly work-related communication (i.e., positive workplace communication network), friendly non work-related communication (i.e., friendships), and hostile or difficult work-related communication (i.e., negative workplace communication network). The response options were scored 0 (never), 1 (rarely), 2 (sometimes), 3 (often), and 4 (always). Network outdegree centrality (average connectedness) score was calculated for each individual per network (friendly work network, friendly non-work network,

and hostile/difficult). Higher scores indicated more frequent communication per type of communication.

Outcomes. *Burnout* was measured using the Oldenburg Burnout Inventory (Demerouti Bakker, Nachreiner, & Schaufeli, 2001; Demerouti, Mostert, & Bakker, 2010). The 16-item scale takes the average score for disengagement and exhaustion with four response options (strongly agree, agree, disagree, strongly disagree). The average of scores was used in analysis after reverse scoring the appropriate items (i.e., 2, 3, 4, 6, 9, 8, 11, 12). The possible scores ranged from 16 to 48 with higher scores indicating greater level of burnout. This burnout measure was chosen instead of the commonly used Maslach Burnout Inventory because it includes both positively and negatively worded questions. Additionally, the Oldenburg Burnout Inventory was chosen because the existing literature showed Cronbach alpha's within the acceptable range —at or above .80—when used with behavioral and mental health providers (Shoji et al., 2015) and for diverse racial/ethnic minority samples (Velez et al., 2018). Using Cronbach's alpha, the reliability of the measure for the current study was 0.86.

Physical health was measured with an adapted version of the Rand 36 Health Survey that measures physical functioning, bodily pain, physical limitations due to physical health problems, role limitations due to physical and emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions (Moorer, Suurmeijer, Foets, & Molenaar, 2001). This study used an adapted version with the subscales: physical functioning (e.g., *"climbing stairs, vigorous or moderate physical activity, walking one or multiple blocks"*), bodily pain, role limitations due to physical health problems (e.g., *"cut down on the amount of time you spend at work, accomplished less than you'd like"*), and general health perceptions (e.g., *"In general, would you say your health is…?"* Moorer, Suurmeijer, Foets, & Molenaar,

2001). The response options varied from dichotomous, 3-point scale, 5-point scale, and 6-point scale response options and scores were calculated per subscale with higher scores indicative of better health. This measure of health was chosen because it captures perceptions of general health, lifestyle adaptations and role limitations due to health, and physical symptoms. Additionally, based on existing literature, the RAND-36 has acceptable internal consistency (Boykin et al., 2016). Using Cronbach's alpha, for the current study, the measures of reliability were 0.83 for physical functioning, 0.76 for limitations due to physical health problems, 0.77 for bodily pain, and 0.82 for general health.

Control variables. Participant *age*, *sex* (male/female), *race*, *ethnicity*, *job type*, (i.e., Nursing, Physician, Allied Health Therapist (e.g., Administrative/Leadership, Allied Health Therapist (e.g., Speech, Occupational, Physical Therapies), Case Management, Housekeeping, Mental/Behavioral Health, Nursing, Physician, Secretarial, Other), *job tenure* (years in current position), *professional tenure* (years in profession), *organizational tenure* (years in employed by the company), and *size of organization* were controlled for within the analyses. *Age* has been associated with job stress and health, therefore it is important to control for its effects and was incorporated into the model using a dummy variable. Social networks have shown differential patterns and effects across *sex* (Gray et al., 2007; Ibarra, 1992, 1993), *job type* (Hämmig & Bauer, 2013)*,* and *tenure* (Lasalvia et al., 2009), therefore, it was important to control for their effects.

<div align="center">

Statistical Analyses

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Analyses were conducted using the statistical software SPSS 24 (IBM Corp 2016). Multiple imputation was used to handle missing data (m = 20; see Tables 1-2 for missing data) and moderation was tested by looking at the interaction terms using regression analyses. The

following groups were used as references groups for dummy variables: White for race, Admin/Leadership for job title, Large for size of organization. The interaction terms were computed for the predictor*moderator (X*Z). Each product term was regressed onto the individual terms (X and Z). Dummy variables were used for categorical variables. Jeremy Dawson's website was used for probing interaction effects (Dawson, 2019).

Results

The means and standard deviations of continuous variables can be found in Table 1 and the frequencies for categorical variables can be found in Table 2. Organizational zip code was also collected, but data are not included in order to maintain confidentiality of employees working in rural areas. The regression results are presented in the following sections organized by hypothesis.

Associations Between Job Stress, Burnout, and Physical Health Outcomes (Hypothesis 1)

Hypothesis 1 stated that job stress would be negatively associated with physical health and positively associated with burnout. Bivariate Pearson correlations showed job stress was negatively related to role limitations due to physical health ($r = -0.19$, $p = .005$) and positively associated with burnout ($r = 0.42$, $p < .001$), but not related to the other physical health variables (i.e., physical functioning, bodily pain, general health perceptions). See Table 1 for all correlation coefficients and descriptive data. The remaining hypotheses were focused on tests of interaction effects, which are discussed in the next section.

Interaction Effects of Friendly Communication (Hypothesis 2)

Hypothesis 2 stated that the association between job stress and health outcomes (burnout, physical health) would change based on the frequency of friendly communication (i.e., friendly non-work-related, friendly work-related). The results of the regression analyses did not provide

support that the association between job stress and burnout changed at different frequencies of friendly work-related communication ($B = .12$, $SE = 0.07$, $p = .085$, $95\% CI = [-.02, .26]$) or friendly non-work-related communication ($B = .13$, $SE = 0.07$, $p = .095$, $95\% CI = [-.02, .27]$)

The results of the regression analyses provided support that the association between job stress and physical health changed at different frequencies of friendly work-related communication, but only for the association between job stress and role limitations ($B = 18.98$, $SE = 7.03$, $p = .007$, $95\% CI = 5.15, 32.79]$). No interaction effects were identified for the other physical health outcomes (i.e., physical functioning, bodily pain, general health perceptions). The interaction plots indicated: 1) with *more* frequent friendly work-related communication, the role limitations appeared similar across levels of stress and 2) with *less* frequent friendly work-related communication, role limitations became worse as job stress increased. These results suggest that without friendly work-related communication employees are more at-risk for physical health issues as job stress increases; however, with more friendly work-related communication their physical health issues tend to stay consistent across different levels of job stress. See Table 2 for regression results and Figure 1 for interaction plots for friendly work-related communication.

Responses to the short-answer response question that asked what topics participants discussed during friendly work-related communication included: patient health diagnoses, treatment, admissions, scheduling, organizational environment, (dis)satisfaction with work, medication, funny things about work, work-related goals or achievements, student-workers, luncheons, birthdays, funding, hiring, deadlines, timesheets, care situations, workflows, advice, weekly tasks, precautions, and vitals.

Interaction Effects of Hostile/Difficult Communication (Hypothesis 3)

Hypothesis 3 stated that the association between job stress and health outcomes (burnout, physical health) would change based on the frequency of hostile or difficult communication. The results of the regression analyses provided evidence that the association between job stress and burnout changed at different frequencies of hostile or difficult communication, ($B = .29$, $SE = .10$, $p = .003$, 95% $CI = [.10, .48]$). The interaction plots indicated: 1) with *less* frequent hostile or difficult communication, burnout appeared similar across levels of job stress and 2) with *more* frequent of hostile or difficult communication, burnout increased as job stress increased. These results suggest that job stress has a consistent association with burnout with the absence of hostile or difficult communication; although, with more frequent hostile or difficult communication job stress became more detrimental for employees' burnout as stress increased.

The results of the regression analyses also provided evidence that the association between job stress and perceptions of general health changed at different frequencies of hostile or difficult communication, ($B = -12.42$, $SE = 5.28$, $p = .019$, 95% $CI = [-22.78, -2.05]$). The interaction plots indicated: 1) with *less* frequent hostile or difficult communication, general perceptions of health appeared similar across levels of job stress and 2) with *more* frequent hostile or difficult communication, general perceptions of health decreased as job stress increased. These results suggest that job stress has a consistent association with perceptions of general health with the absence of hostile or difficult communication; although, with more frequent hostile or difficult communication job stress became more detrimental for employees' health as work becomes more stressful. See Table 3 for regression results and Figure 2 for interaction plots for hostile/difficult communication.

Responses to the short-answer response question that asked what topics participants discussed during hostile or difficult communication included: difficult patients, limitations to patient care, bullying, overtime, productivity, wellbeing, performance improvement, establishing priorities, lines of communication, organizational process, performance reviews, disciplinary meetings, promotions, job burnout, medical problems, salary, coordinating treatment, lack of help from leadership, boundaries, meeting personal needs, differences in opinion and work styles, budget, leadership changes, and staffing issues.

Discussion

The purpose of this study was to examine whether workplace interpersonal relationships changed the association between healthcare employees' job stress and health outcomes (i.e., burnout, physical health), using the lens of social network theory in order to help inform the Quadruple Aim (Bodenheimer & Sinsky, 2014) and better understand the potential benefits of team-based healthcare. The results from this study provided evidence that (a) communication within the workplace interacted differently with job stress depending on whether the interactions evoked positive or negative sentiments (Kadushin, 2012) and (b) the interactions amongst team members was related to employees' health and wellbeing. In this study, more frequent friendly work-related communication benefitted employees' health (i.e., fewer role limitations) while more frequent hostile or different communication was detrimental to employees' health (i.e., higher burnout, poorer perceptions of general health).

These results highlighted benefits of utilizing social network theory and importance of considering multiple types of interpersonal relationships in relation to employees' health and wellbeing. The results indicated when employees' were collaborating about work-related topics (e.g., coordinating treatment plans) in high stress situations, the influence of interpersonal

exchanges depended on the underlying sentiment (i.e., friendly or hostile/difficult) and frequency of communication (i.e., low or high). The Academy of Medicine discussed that teamwork can either be a job demand or resource depending on a variety of factors, including effective communication (Smith et al., 2019). This study provided preliminary findings that using social network theory is an effective framework for operationalizing communication in order to quantitatively examine when and how workplace interpersonal relationships are beneficial or detrimental to employees' health and wellbeing. This study's short-answer exploration of topics discussed during this communication adds additional insights.

The differences in topics discussed between friendly work-related and hostile or difficult conversations is noteworthy when conceptualizing the risk factors for healthcare employees' wellbeing. Based on the Academy of Medicine's conceptual model of factors affecting clinicians' wellbeing and resilience, employees reported discussing factors that are external to them in both friendly and hostile or difficult interactions (e.g., workflow, treatment, patient care), but only identified discussing factors that are internal to them (i.e., personal development, wellbeing, skills, and abilities; National Academy of Sciences, 2019b) during hostile or difficult communication (e.g., job burnout, promotions, salary, establishing boundaries, medical problems, meeting personal needs). Thus, in addition to considering how certain factors threaten the healthcare employees' wellbeing (e.g., burnout, insufficient salary, poor work-life balance), these results suggest researchers should examine the effect of the communication surrounding these factors. While these results expand the understanding about when workplace interpersonal relationships are beneficial or detrimental, it is important to acknowledge its limitations that point to directions for future research.

Limitations and Future Research

The limitations of this study set the stage for avenues for future research. The cross-sectional design limits assumptions that can be made about causality; therefore, future research should explore these associations using a longitudinal design. Using other data collection procedures often used with social network theory can deepen the understanding of interpersonal interactions and their effects, such as diary entries, structured or naturalistic observation of workplace interactions, collecting reciprocal and directed interpersonal data, or utilizing interdisciplinary communication in email messages or electronic health records. The job effort and reward measures used to calculate job stress showed acceptable to poor reliability, thus, future research would benefit from testing alternative measurements of job stress. Additionally, future researchers should explore the generalization of these results by testing these hypotheses in samples across diverse geographic regions and how these results relate to patient care (e.g., empathizing and attuning to patients).

Conclusion

This study provided evidence that healthcare employees' burnout and physical health is influenced by the interaction between job stress and workplace interpersonal relationships. Overall, results suggested healthcare employees' burnout and physical health benefitted by friendly work-related communication, but was negatively affected by hostile or difficult communication. The findings support organizations attending to workplace interpersonal relationships when addressing the national movements to improve healthcare employees' health and wellbeing. Future studies are warranted to continue investigating the role of workplace interpersonal relationships in promoting employees' health and wellbeing.

Table 1

Descriptive data and correlations

	Mean	SD	N	Missing	Age	Jtenure	Otenure	Ptenure	Jstress	Fwk	Fnwk	Host	Burn	Physf	Limit	Pain	Ghealth
Age	39.27	10.55	226	11	1												
Jtenure	6.67	6.69	236	1	**.34 (<.001)**	1											
Otenure	6.90	6.08	236	1	**.43 (<.001)**	**.76 (<.001)**	1										
Ptenure	12.52	9.81	237	0	**.82 (<.001)**	**.34 (<.001)**	**.43 (<.001)**	1									
Jstress	1.14	0.44	219	18	.01 (.941)	.07 (.342)	**.15 (.027)**	-.02 (.759)	1								
Fwk	2.09	0.82	223	14	-.11 (.109)	-.08 (.224)	-.11 (.106)	-.01 (.946)	.02 (.777)	1							
Fnwk	1.57	0.89	222	15	-.07 (.342)	.04 (.598)	-.02 (.802)	.03 (.648)	-.08 (.240)	**.63 (<.001)**	1						
Host/diff	0.80	0.82	221	16	**-.31 (<.001)**	**.29 (<.001)**	.16 (.020)	**-.21 (.002)**	.04 (.552)	.08 (.270)	**.30 (<.001)**	1					
Burn	2.34	0.42	237	0	**-.28 (<.001)**	-.05 (.405)	-.02 (.724)	**-.25 (<.001)**	**.42 (<.001)**	**-.15 (.023)**	**-.17 (.012)**	**.30 (<.001)**	1				
Physf	75.69	24.01	229	8	-.12 (.067)	**-.36 (<.001)**	**-.26 (<.001)**	-.10 (.151)	.05 (.432)	.10 (.147)	-.06 (.350)	**-.41 (<.001)**	**-.20 (.002)**	1			
Limit	65.33	36.25	231	6	**.24 (<.001)**	**-.15 (.020)**	-.08 (.247)	**.20 (.003)**	**-.19 (.005)**	.07 (.318)	-.05 (.430)	**-.51 (<.001)**	**-.44 (<.001)**	**.47 (<.001)**	1		
Pain	77.17	20.27	229	8	-.03 (.710)	**-.19 (.003)**	-.11 (.114)	0 (.997)	-.01 (.869)	.10 (.135)	-.09 (.209)	**-.42 (<.001)**	**-.20 (.002)**	**.61 (<.001)**	**.35 (<.001)**	1	
Ghealth	66.70	18.42	235	2	.01 (.878)	.01 (.898)	.01 (.943)	.08 (.236)	-.09 (.174)	**.16 (.020)**	.13 (.059)	-.09 (.205)	**-.30 (<.001)**	**.45 (<.001)**	**.38 (<.001)**	**.44 (<.001)**	1

Note. Bold indicates p < .05; Jtenure = job tenure; Ptenure = professional tenure; Jstress = job stress; Fwk = friendly work-related comm; Fnwk = friendly non-work-related comm; Host/diff = hostility or difficult comm; Burn = burnout; Physf = physical functioning; Limit = role limitations; Pain = bodily pain; Ghealth = general health

Table 2

Frequency for categorical descriptives

Variable		Missing	Count	%
Sex		1	236	
	Female		165	69.6
	Male		71	30
Race		0	27	
	American Indian or Alaskan Native		2	0.8
	Asian		5	2.1
	Black or African American		36	15.2
	Native Hawaiian or Other Pacific Islander		0	0
	Other		9	3.8
	White		185	78.1
Ethnicity		1	236	
	Hispanic or Latino		30	0.4
	Not Hispanic or Latino		206	86.9
Job Title		0	237	
	Admin/Leadership		35	14.8
	Allied Health Therapies		24	10.1
	Case Management		10	4.2
	Dentist		7	3
	Housekeeping		5	2.1
	Mental/Beh Health		28	11.8
	Nursing		44	18.6
	Pharmacist		13	5.5
	Physician		26	11
	Other		25	10.5
	Secretarial		20	8.4
Size		1	236	
	Micro		11	4.6
	Small		52	21.9
	Medium		72	30.4
	Large		101	42.6

Table 3

Multiple regression of friendly work related communication and job stress predicting burnout

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	**0.06**	0.08	0.421	-0.09	0.22	0.07	0.08	0.361	-0.08	0.23
Age	**-0.01**	0.00	0.001	-0.02	-0.01	**-0.01**	0.00	0.002	-0.02	-0.01
Jtenure	**-0.01**	0.01	0.401	-0.02	0.01	-0.01	0.01	0.363	-0.02	0.01
Otenure	0.00	0.01	0.858	-0.01	0.01	0.00	0.01	0.762	-0.01	0.01
Ptenure	0.00	0.00	0.732	-0.01	0.10	0.00	0.00	0.706	-0.01	0.01
Sex	0.04	0.06	0.517	-0.08	0.15	0.04	0.06	0.445	-0.07	0.16
Aian	**-0.98**	0.28	<.001	-1.53	-0.44	**-0.81**	0.30	0.006	-1.39	-0.23
Asian	0.04	0.16	0.797	-0.27	0.35	0.03	0.16	0.844	-0.28	0.34
Aa	-0.11	0.07	0.116	-0.24	0.03	-0.11	0.07	0.115	-0.24	0.03
Other	-0.15	0.13	0.253	-0.41	0.11	-0.15	0.13	0.262	-0.41	0.11
Micro	0.09	0.12	0.468	-0.15	0.32	0.07	0.12	0.590	-0.17	0.30
Small	-0.03	0.07	0.690	-0.17	0.11	-0.02	0.07	0.758	-0.16	0.12
Medium	0.01	0.06	0.818	-0.10	0.13	0.02	0.06	0.710	-0.10	0.14
Allied	0.16	0.10	0.100	-0.03	0.34	0.17	0.10	0.068	-0.01	0.36
CM	0.14	0.13	0.258	-0.11	0.39	0.14	0.13	0.260	-0.11	0.39
Dentist	0.18	0.16	0.248	-0.13	0.49	0.18	0.16	0.254	-0.13	0.49
HK	0.29	0.17	0.087	-0.04	0.61	0.29	1.66	0.076	-0.03	0.62
Mental	**-0.08**	0.10	0.406	-0.27	0.11	-0.06	0.10	0.500	-0.25	0.12
Nursing	**0.18**	0.09	0.034	0.01	0.35	**0.19**	0.09	0.030	0.02	0.35
Pharmacist	0.03	0.12	0.788	-0.20	0.27	0.02	0.12	0.853	-0.21	0.26
Physician	**0.26**	0.10	0.007	0.70	0.45	**0.25**	0.10	0.009	0.06	0.44
Secretarial	0.19	0.10	0.060	-0.01	0.38	0.17	0.10	0.078	-0.02	0.37
Other	-0.13	0.10	0.192	-0.32	0.06	-0.12	0.10	0.225	-0.31	0.07
Job stress	**0.46**	0.06	<.001	0.34	0.58	0.24	0.15	0.104	-0.05	0.53
Fwk	**-0.14**	0.03	<.001	-0.20	-0.19	**-0.27**	0.08	0.001	-0.43	-0.11
Interaction						0.12	0.07	0.085	-0.02	0.26

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Fwk = Friendly work related communicaton

Table 4

Multiple regression of friendly work related communication and job stress predicting physical functioning

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	5.97	4.92	0.225	-3.68	15.61	6.14	4.93	0.212	-3.51	15.80
Age	-0.17	0.25	0.493	-0.66	0.32	-0.17	0.25	0.494	-0.66	0.32
Jtenure	**-0.91**	0.35	0.01	-1.60	-0.21	**-0.91**	0.36	0.01	-1.61	-0.22
Otenure	-0.03	0.39	0.947	-0.80	0.75	-0.01	0.40	0.978	-0.79	0.76
Ptenure	0.13	0.26	0.618	-0.38	0.65	0.14	0.26	0.605	-0.38	0.65
Sex	-0.03	3.69	0.994	-7.25	7.20	0.11	3.71	0.977	-7.16	7.37
Aian	3.37	17.45	0.847	-30.83	37.57	6.82	18.59	0.714	-29.62	43.27
Asian	7.93	9.93	0.425	-11.54	27.39	7.74	9.95	0.436	-11.76	27.25
Aa	6.06	4.16	0.145	-2.09	14.22	6.09	4.17	0.144	-2.07	14.26
Other	7.62	8.30	0.358	-8.64	23.89	7.70	8.31	0.354	-8.59	23.98
Micro	6.96	7.65	0.363	-8.03	21.96	6.52	7.71	0.398	-8.59	21.62
Small	**-11.05**	4.41	0.012	-19.69	-2.41	**-10.92**	4.43	0.014	-19.60	-2.24
Medium	**-7.57**	3.76	0.044	-14.95	-0.19	-7.42	3.79	0.050	-14.84	0.01
Allied	6.59	5.89	0.263	-4.96	18.14	6.91	5.92	0.243	-4.69	18.52
CM	-15.26	7.93	0.054	-30.81	0.29	-15.29	7.94	0.054	-30.85	0.28
Dentist	-15.88	9.57	0.097	-34.64	2.88	-15.94	9.59	0.096	-34.74	2.85
HK	-18.04	10.43	0.084	-38.48	2.39	-17.86	10.44	0.087	-38.32	2.59
Mental	3.75	6.06	0.536	-8.13	15.62	4.06	6.09	0.505	-7.88	15.99
Nursing	**-13.27**	5.39	0.014	-23.84	-2.71	**-13.22**	5.39	0.014	-23.79	-2.64
Pharmacist	-12.82	7.50	0.087	-27.52	1.87	-13.02	7.52	0.083	-27.76	1.72
Physician	3.62	6.18	0.557	-8.48	15.73	3.43	6.18	0.579	-8.69	15.56
Secretarial	-0.18	6.20	0.997	-12.34	11.98	-0.47	6.24	0.941	-12.70	11.77
Other	1.06	5.95	0.859	-10.61	12.72	1.26	5.96	0.833	-10.41	12.93
Job stress	4.70	3.31	0.217	-2.76	12.15	0.24	9.06	0.979	-17.55	18.02
Fwk	**4.47**	1.89	0.018	0.77	8.16	1.85	5.11	0.717	-8.18	11.89
Interaction						2.43	4.42	0.583	-6.26	11.12

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Fwk = Friendly work related communicaton

Table 5

Multiple regression of friendly work related communication and job stress predicting role limitations

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	-7.97	7.95	0.316	-23.54	7.60	-6.63	7.83	0.397	-21.99	8.72
Age	0.66	0.42	0.111	-0.15	1.47	0.67	0.41	0.104	-0.14	1.48
Jtenure	-0.74	0.57	0.193	-1.86	0.38	-0.80	0.56	0.154	-1.90	0.30
Otenure	-0.13	0.63	0.834	-1.37	1.10	-0.01	0.62	0.986	-1.23	1.20
Ptenure	0.24	0.43	0.584	-0.61	1.08	0.26	0.43	0.539	-0.58	1.11
Sex	9.75	5.92	0.100	-1.86	21.36	10.76	5.83	0.065	-0.67	22.19
Aian	-61.17	35.97	0.092	-132.42	10.08	-34.13	35.85	0.343	-104.97	36.71
Asian	6.80	16.02	0.671	-24.60	38.19	6.04	15.73	0.736	-25.53	36.14
Aa	2.32	6.70	0.729	-10.81	15.45	2.42	6.59	0.713	-10.50	15.34
Other	12.33	13.38	0.357	-13.89	38.19	12.91	13.14	0.326	-12.85	38.67
Micro	9.24	12.57	0.462	-15.41	33.89	5.75	12.39	0.643	-18.55	30.05
Small	-2.55	7.00	0.715	-16.27	11.17	-1.57	6.90	0.820	-15.10	11.95
Medium	-6.26	6.03	0.299	-18.07	5.56	-5.00	5.96	0.402	-16.69	6.69
Allied	-4.01	9.51	0.673	-22.65	14.63	-1.45	9.38	0.877	-19.83	16.99
CM	-5.71	12.74	0.654	-30.69	19.26	-5.94	12.51	0.635	-30.45	18.57
Dentist	-16.74	15.40	0.277	-46.93	13.45	-17.26	15.22	0.257	-47.09	12.57
HK	-12.44	16.75	0.458	-45.27	20.38	-11.11	16.45	0.499	-43.34	21.13
Mental	-7.12	9.66	0.461	-26.05	11.81	-4.75	9.51	0.618	-23.39	13.90
Nursing	-15.41	8.59	0.073	-32.24	1.42	-15.03	8.45	0.075	-31.59	1.53
Pharmacist	-6.17	12.07	0.609	-29.82	17.48	-7.73	11.87	0.515	-31.00	15.53
Physician	0.99	9.95	0.921	-18.53	20.51	-0.37	9.76	0.970	-19.51	18.77
Secretarial	6.70	10.06	0.505	-13.01	26.42	4.53	10.01	0.651	-15.09	24.15
Other	7.88	9.59	0.411	-10.91	26.65	9.31	9.46	0.325	-9.22	27.85
Job stress	**-22.05**	6.68	0.001	-35.18	-8.91	**-56.91**	15.02	<.001	-86.47	-27.35
Fwk	**6.44**	3.10	0.038	0.36	12.51	-13.94	8.19	0.089	-30.03	2.15
Interaction						**18.98**	7.03	0.007	5.17	32.79

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Fwk = Friendly work related communicaton

Table 6

Multiple regression of friendly work related communication and job stress predicting bodily pain

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	2.95	4.62	0.523	-6.11	12.01	2.92	4.64	0.528	-6.16	12.01
Age	-0.08	0.23	0.731	-0.50	0.37	-0.08	0.23	0.728	-0.53	0.37
Jtenure	-0.39	0.33	0.234	-1.03	0.25	-0.39	0.33	0.237	-1.04	0.26
Otenure	0.21	0.36	0.565	-0.50	0.92	0.21	0.37	0.574	-0.51	0.92
Ptenure	0.00	0.24	0.989	-4.78	0.47	0.00	0.24	0.990	-0.48	0.47
Sex	-0.76	3.38	0.832	-7.37	5.86	-0.78	3.39	0.818	-7.42	5.86
Aian	-17.99	16.14	0.265	-49.62	13.64	-18.64	17.26	0.280	-52.46	15.86
Asian	4.92	9.20	0.593	-13.11	22.95	4.96	9.23	0.591	-13.12	23.04
Aa	0.60	3.85	0.876	-6.95	8.15	0.61	3.86	0.875	-6.96	8.17
Other	3.09	7.69	0.688	-11.98	18.17	3.08	7.71	0.689	-12.02	18.19
Micro	6.86	7.03	0.329	-6.92	20.63	6.95	7.10	0.328	-6.97	20.86
Small	**-8.95**	4.10	0.029	-17.00	-0.91	**-8.98**	4.11	0.029	-17.04	-0.91
Medium	-2.43	3.51	0.489	-9.31	4.46	-2.47	3.52	0.484	-9.38	4.44
Allied	**-11.60**	5.51	0.035	-22.39	-0.81	**-11.67**	5.55	0.036	-22.55	-0.78
CM	**-17.34**	7.37	0.018	-31.88	-2.99	**-17.43**	7.39	0.018	-31.90	-2.95
Dentist	-10.50	8.87	0.236	-27.88	6.88	-10.50	8.89	0.237	-27.92	6.92
HK	**-28.72**	9.71	0.003	-47.75	-9.68	**-28.74**	9.74	0.003	-47.82	-9.66
Mental	-4.36	5.63	0.439	-15.39	6.68	-4.42	5.67	0.436	-15.53	6.70
Nursing	**-12.09**	5.12	0.018	-22.12	-2.06	**-12.09**	5.12	0.018	-22.14	-2.05
Pharmacist	**-16.69**	6.99	0.017	-30.40	-2.99	**-16.65**	7.01	0.018	-30.39	-2.91
Physician	-7.05	5.71	0.218	-18.25	4.15	-7.02	5.72	0.220	-18.23	4.19
Secretarial	-5.25	5.79	0.365	-16.60	6.11	-5.21	5.82	0.371	-16.63	6.21
Other	-0.34	5.56	0.952	-11.23	10.56	-0.38	5.57	0.945	-11.31	10.54
Job stress	2.37	3.50	0.498	-4.49	9.23	3.21	8.28	0.698	-13.04	19.45
Fwk	**4.04**	1.74	0.021	0.62	7.45	4.52	4.65	0.331	-4.61	13.65
Inteaction						-0.46	4.00	0.909	-8.31	7.40

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Fwk = Friendly non-work related communicaton

Table 7

Multiple regression of friendly work related communication and job stress predicting general health

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	-1.67	4.36	0.702	-10.22	6.87	-1.57	4.38	0.720	-10.15	7.01
Age	-0.18	0.22	0.411	-0.60	0.25	-0.18	0.22	0.413	-0.60	0.25
Jtenure	0.23	0.31	0.468	-0.39	0.84	**0.22**	0.31	0.478	0.39	0.84
Otenure	0.02	0.35	0.965	-0.66	0.70	0.02	0.35	0.945	-0.66	0.71
Ptenure	0.25	0.23	0.272	-0.20	0.70	0.25	0.23	0.269	-0.20	0.70
Sex	-2.46	3.18	0.439	-8.69	3.77	-2.41	3.20	0.452	-8.69	3.87
Aian	-9.62	15.30	0.530	-39.60	20.37	-7.75	16.36	0.636	-39.82	24.33
Asian	-3.31	8.70	0.730	-20.36	13.73	-3.40	8.72	0.697	-20.50	13.70
Aa	2.63	3.63	0.469	-4.49	9.75	2.64	3.64	0.468	-4.49	9.77
Other	4.75	7.26	0.513	-9.47	18.97	4.78	7.27	0.510	-9.46	19.03
Micro	6.85	6.74	0.310	-6.36	20.05	6.60	6.81	0.332	-6.75	19.96
Small	1.61	3.85	0.677	-5.94	9.15	1.66	3.86	0.667	-5.91	9.23
Medium	-1.48	3.22	0.646	-7.78	4.82	-1.40	3.23	0.663	-7.72	4.92
Allied	-2.83	5.16	0.584	-12.93	7.28	-2.64	5.19	0.611	-12.82	7.54
CM	**-18.37**	6.94	0.008	-31.96	-4.78	**-18.38**	6.95	0.008	-32.00	-4.77
Dentist	-15.96	8.37	0.056	-32.36	0.44	-15.98	8.39	0.057	-32.43	0.47
HK	-9.78	9.11	0.283	-27.64	8.08	-9.68	9.13	0.289	-27.58	8.22
Mental	**-12.29**	5.28	0.020	-22.63	-1.94	**-12.12**	5.34	0.023	-22.56	-1.69
Nursing	-5.20	4.67	0.265	-14.35	3.95	-5.16	4.67	0.270	-14.32	4.01
Pharmacist	-10.70	6.56	0.103	-23.56	2.17	-10.80	6.58	0.101	-23.70	2.11
Physician	-4.23	5.34	0.428	-14.69	6.24	-4.34	5.34	0.416	-14.81	6.13
Secretarial	-6.52	5.35	0.223	-17.01	3.97	-6.67	5.38	0.215	-17.22	3.88
Other	-1.79	5.19	0.729	-11.96	8.37	-1.70	5.20	0.744	-11.90	8.50
Job stress	-3.61	3.36	0.282	-10.20	2.98	-6.01	7.96	0.451	-21.64	9.63
Fwk	**3.58**	1.63	0.028	0.38	6.79	2.18	4.46	0.625	-6.58	10.94
Interaction						1.30	3.89	0.738	-6.34	8.94

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; FNWK = Friendly non-work related communicaton

Table 8

Multiple regression of friendly non work communication and job stress predicting burnout

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	0.08	0.08	0.320	-0.08	0.24	0.10	0.08	0.239	-0.06	0.26
Age	**-0.01**	0.00	0.003	-0.02	0.00	**-0.01**	0.00	0.001	-0.02	-0.01
Jtenure	0.00	0.01	0.441	-0.02	0.01	0.00	0.01	0.451	-0.02	0.01
Otenure	0.00	0.01	0.65	-0.01	0.02	0.00	0.01	0.683	-0.01	0.02
Ptenure	0.00	0.00	0.852	-0.01	0.01	0.00	0.00	0.657	-0.01	0.01
Sex	0.03	0.06	0.676	-0.09	0.14	0.02	0.06	0.699	-0.09	0.14
Aian	**-0.82**	0.29	0.004	-1.38	-0.26	**-0.93**	0.29	0.002	-1.50	-0.35
Asian	0.04	0.16	0.796	-0.28	0.36	0.03	0.16	0.862	-0.29	0.35
Aa	-0.11	0.07	0.099	-0.25	0.02	-0.10	0.07	0.134	-0.24	0.03
Other	-0.17	0.14	0.209	-0.44	0.10	-0.20	0.14	0.153	-0.46	0.07
Micro	0.11	0.12	0.375	-0.13	0.35	0.12	0.12	0.329	-0.12	0.36
Small	0.01	0.07	0.842	-0.13	0.16	0.01	0.07	0.846	-0.13	0.16
Medium	0.03	0.06	0.613	-0.09	0.15	0.03	0.06	0.640	-0.09	0.15
Allied	0.11	0.10	0.265	-0.08	0.30	0.12	0.10	0.221	-0.07	0.31
CM	0.14	0.13	0.287	-0.12	0.39	0.13	0.13	0.317	-0.12	0.38
Dentist	0.15	0.16	0.344	-0.16	0.47	0.14	0.16	0.399	-0.18	0.45
HK	0.31	0.17	0.075	-0.03	0.64	0.30	0.17	0.077	-0.03	0.64
Mental	-0.10	0.10	0.317	-0.29	0.09	-0.10	0.10	0.293	-0.29	0.09
Nursing	0.15	0.09	0.093	-0.03	0.32	0.16	0.09	0.071	-0.01	0.33
Pharmacist	-0.04	0.12	0.774	-0.28	0.21	-0.03	0.12	0.793	-0.27	0.21
Physician	**0.22**	0.10	0.028	0.02	0.41	**0.22**	0.10	0.025	0.03	0.41
Secretarial	0.17	0.10	0.110	-0.04	0.37	0.16	0.10	0.128	-0.05	0.36
Other	-0.12	0.10	0.245	-0.31	0.08	-0.12	0.10	0.230	-0.32	0.08
Job stress	**0.43**	0.06	<.001	0.30	0.55	**0.25**	0.12	0.039	0.01	0.50
FNWK	**-0.09**	0.03	0.002	-0.15	-0.03	**-0.23**	0.09	0.009	-0.40	-0.06
Interaction						0.13	0.08	0.095	-0.02	0.27

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; FNWK = Friendly non-work related communicaton

Table 9

Multiple regression of friendly non work related communication and job stress predicting physical functioning

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	5.43	4.96	0.273	-4.29	15.15	4.99	4.97	0.325	-4.85	14.64
Age	-0.20	0.25	0.434	-0.69	0.30	-0.16	0.25	0.537	-0.65	0.34
Jtenure	**-0.92**	0.36	0.01	-1.62	-0.22	**-0.92**	0.36	0.010	-1.62	-0.22
Otenure	-0.08	0.40	0.834	-0.86	0.70	0.07	0.40	0.853	-0.85	0.71
Ptenure	0.16	0.27	0.547	-0.36	0.68	0.12	0.27	0.650	-0.40	0.64
Sex	0.33	3.73	0.930	-6.99	7.64	0.38	3.72	0.918	-6.91	7.67
Aian	-1.50	17.59	0.932	-35.97	32.97	2.19	18.01	0.903	-33.12	37.50
Asian	8.14	10.04	0.418	-11.54	27.83	8.62	10.06	0.391	-11.09	28.33
Aa	6.29	4.20	0.135	-1.95	14.54	5.92	4.22	0.161	-2.35	14.19
Other	8.25	8.37	0.324	-8.15	24.65	9.06	8.39	0.280	-7.39	25.51
Micro	6.02	7.73	0.436	-9.13	21.16	5.67	7.73	0.464	-9.49	20.83
Small	**-12.23**	4.50	0.007	-21.05	-3.40	**-12.22**	4.50	0.007	-21.04	-3.41
Medium	**-8.07**	3.81	0.034	-15.53	-0.60	**-7.99**	3.80	0.036	-15.44	-0.53
Allied	8.14	5.92	0.169	-3.46	19.73	7.78	5.93	0.189	-3.84	19.40
CM	-15.13	8.01	0.059	-30.82	0.57	-14.83	8.01	0.064	-30.54	0.87
Dentist	-14.86	9.61	0.122	-33.70	3.98	-14.34	9.63	0.137	-33.23	4.54
HK	-18.42	10.56	0.081	-39.11	2.28	-18.31	10.55	0.083	-38.99	2.37
Mental	4.24	6.14	0.490	-7.80	16.28	4.39	6.14	0.475	-7.65	16.42
Nursing	**-11.85**	5.40	0.028	-22.44	-1.27	**-12.21**	5.40	0.024	-22.79	-1.62
Pharmacist	-10.97	7.53	0.155	-25.45	4.06	-10.81	7.53	0.151	-25.56	3.94
Physician	5.01	6.19	0.418	-7.12	17.15	4.87	6.19	0.432	-7.27	17.00
Secretarial	0.18	6.36	0.977	-12.29	12.65	0.47	6.37	0.941	-12.01	12.95
Other	0.53	6.00	0.930	-11.23	12.28	0.66	5.99	0.912	-11.08	12.40
Job stress	5.59	3.84	0.145	-1.93	13.11	11.66	7.68	0.120	-3.43	26.74
FNWK	2.34	1.85	0.206	-1.29	5.97	7.03	5.27	0.183	-3.32	17.38
Interaction						-4.35	4.74	0.359	-13.68	4.97

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; FNWK = Friendly non-work related communicaton

Table 10

Multiple regression of friendly non work related communication and job stress predicting role limitations

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	-8.65	8.01	0.280	-24.36	7.06	-10.00	8.03	0.213	-25.74	5.74
Age	0.60	0.42	0.152	-0.22	1.43	0.71	0.42	0.088	-0.11	1.53
Jtenure	-0.76	0.58	0.185	-1.89	0.37	-0.77	0.57	0.179	-1.90	0.35
Otenure	-0.21	0.64	0.740	-1.45	1.03	-0.19	0.63	0.770	-1.42	1.05
Ptenure	0.31	0.44	0.475	-0.54	1.17	0.21	0.44	0.625	-0.64	1.07
Sex	10.03	6.00	0.095	-1.74	21.79	10.19	5.97	0.088	-1.51	21.89
Aian	-66.06	36.09	0.070	-137.50	5.39	-56.65	35.66	0.114	-127.12	13.81
Asian	8.29	16.19	0.609	-23.44	40.03	9.51	16.14	0.556	-22.13	41.14
Aa	2.45	6.77	0.718	-10.83	15.72	1.53	6.78	0.822	-11.77	14.82
Other	13.28	13.48	0.325	-13.14	39.71	15.34	13.48	0.255	-11.07	41.76
Micro	6.65	12.81	0.604	-18.48	31.77	5.73	12.76	0.653	-19.30	30.76
Small	-3.39	7.18	0.637	-17.45	10.68	-3.37	7.15	0.638	-17.39	10.65
Medium	-6.73	6.13	0.272	-18.75	5.29	-6.53	6.10	0.285	-18.49	5.43
Allied	-1.77	9.55	0.853	-20.49	16.96	-2.63	9.54	0.783	-21.32	16.07
CM	-5.62	12.89	0.663	-30.88	19.64	-4.84	12.84	0.706	-30.02	20.33
Dentist	-14.85	15.52	0.338	-45.27	15.56	-13.45	15.54	0.386	-43.92	17.02
HK	-11.65	16.99	0.493	-44.95	21.65	-11.36	16.19	0.502	-44.51	21.79
Mental	-6.95	9.78	0.478	-26.12	12.23	-6.54	9.73	0.501	-25.61	12.53
Nursing	-11.97	8.64	0.166	-28.90	4.96	-12.84	8.62	0.136	-29.73	4.05
Pharmacist	-3.32	12.13	0.785	-27.09	20.46	-3.58	12.08	0.767	-27.25	20.09
Physician	3.20	10.03	0.750	-16.47	22.87	2.86	10.02	0.775	-16.78	22.50
Secretarial	5.44	10.29	0.597	-14.73	25.61	6.25	10.27	0.543	-13.88	26.38
Other	6.34	9.67	0.512	-12.62	25.30	6.68	9.64	0.488	-12.21	25.57
Job stress	**-21.55**	6.83	0.002	-34.98	-8.12	-6.19	12.06	0.608	-29.86	17.48
FNWK	0.76	3.01	0.801	-5.15	6.66	12.65	8.51	0.138	-4.06	29.36
Interaction						-11.04	7.55	0.144	-25.88	3.80

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; FNWK = Friendly non-work related communicaton

Table 11

Multiple regression of friendly non work related communication and job stress predicting bodily pain

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	2.53	4.68	0.589	-6.64	11.70	1.93	4.71	0.682	-7.30	11.15
Age	-0.12	0.23	0.618	-0.57	0.34	-0.07	0.23	0.772	-0.53	0.39
Jtenure	-0.41	0.33	0.221	-1.06	0.25	-0.41	0.33	0.217	-1.06	0.24
Otenure	0.16	0.37	0.664	-0.56	0.88	0.17	0.37	0.644	-0.55	0.89
Ptenure	0.05	0.25	0.846	-0.44	0.53	0.00	0.25	0.991	-0.48	0.49
Sex	-0.60	3.42	0.862	-7.30	6.10	-0.53	3.42	0.878	-7.22	6.17
Aian	-29.86	16.43	0.204	-53.06	11.34	-16.60	16.78	0.322	-49.48	16.28
Asian	5.95	9.34	0.524	-12.36	24.27	6.52	9.35	0.485	-11.79	24.84
Aa	0.65	3.90	0.868	-7.00	8.30	0.25	3.91	0.949	-7.42	7.91
Other	3.70	7.79	0.635	-11.57	18.97	4.66	7.83	0.552	-10.69	20.00
Micro	5.13	7.18	0.475	-8.94	19.19	4.72	7.17	0.511	-9.34	18.78
Small	**-9.37**	4.20	0.026	-17.60	-1.14	**-9.35**	4.19	0.026	-17.57	-1.13
Medium	-2.69	3.58	0.453	-9.71	4.34	-2.59	3.57	0.468	-9.59	4.41
Allied	-10.21	5.55	0.066	-21.08	0.67	-10.59	5.55	0.056	-21.47	0.29
CM	**-17.39**	7.48	0.020	-32.04	-2.74	**-17.03**	7.47	0.023	-31.68	-2.39
Dentist	-9.32	8.95	0.298	-26.86	8.23	-8.69	8.97	0.332	-26.27	8.89
HK	**-28.11**	9.89	0.004	-47.49	-8.73	**-27.98**	9.87	0.005	-47.32	-8.63
Mental	-4.31	5.72	0.451	-15.52	6.90	-4.13	5.72	0.471	-15.33	7.08
Nursing	-9.82	5.18	0.058	-19.99	0.34	**-10.20**	5.19	0.049	-20.33	-0.04
Pharmacist	**-14.93**	7.05	0.034	-28.74	-1.13	**-15.05**	7.03	0.032	-28.83	-1.27
Physician	-5.62	5.74	0.328	-16.87	5.63	-5.77	5.74	0.315	-17.02	5.48
Secretarial	-6.21	5.95	0.297	-17.87	5.46	-5.82	5.97	0.330	-17.52	5.88
Other	-1.40	5.63	0.804	-12.44	9.64	-1.29	5.61	0.818	-12.28	9.70
Job stress	2.60	3.60	0.470	-4.46	9.66	9.50	7.25	0.191	-4.76	23.76
FNWK	0.23	1.71	0.894	-3.13	3.59	5.57	5.02	0.268	-4.30	15.44
Interaction						-4.96	4.42	0.262	-13.65	3.72

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; FNWK = Friendly non-work related communicaton

Table 12

Multiple regression of friendly non work related communication and job stress predicting general health

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	-2.13	4.38	0.628	-10.72	6.47	-2.05	4.43	0.644	-10.74	6.65
Age	-0.19	0.22	0.374	-0.62	0.23	-0.20	0.22	0.365	-0.63	0.23
Jtenure	0.22	0.31	0.481	-0.40	0.84	0.22	0.32	0.481	-0.40	0.84
Otenure	-0.03	0.35	0.928	-0.71	0.65	-0.03	0.35	0.925	-0.72	0.65
Ptenure	0.26	0.23	0.249	-0.19	0.71	0.27	0.23	0.245	-0.19	0.73
Sex	-2.12	3.20	0.508	-8.39	4.15	-2.15	3.20	0.502	-8.42	4.13
Aian	-14.11	15.36	0.358	-44.22	16.01	-13.62	15.80	0.355	-45.60	16.36
Asian	-3.46	8.74	0.693	-20.59	13.68	-3.51	8.78	0.689	-20.71	13.69
Aa	2.86	3.65	0.434	-4.30	10.02	2.92	3.68	0.428	-4.29	10.12
Other	5.23	7.29	0.473	-9.06	19.51	5.11	7.35	0.487	-9.30	19.52
Micro	6.41	6.76	0.343	-6.83	19.65	6.48	6.76	0.338	-6.78	19.73
Small	0.41	3.89	0.917	-7.22	8.04	0.39	3.90	0.919	-7.24	8.03
Medium	-1.96	3.23	0.545	-8.29	4.38	-1.98	3.24	0.542	-8.33	4.38
Allied	-1.59	5.15	0.758	-11.69	8.52	-1.55	5.17	0.765	-11.68	8.59
CM	**-18.23**	6.97	0.009	-31.90	-4.57	**-18.28**	6.99	0.009	-31.98	-4.59
Dentist	-15.22	8.38	0.069	-31.65	1.20	-15.35	8.42	0.068	-31.86	1.15
HK	-10.43	9.19	0.256	-28.44	7.57	-10.45	9.20	0.256	-28.48	7.59
Mental	**-11.75**	5.32	0.027	-22.18	-1.31	**-11.78**	5.33	0.027	-22.23	-1.33
Nursing	-4.43	4.67	0.320	-13.57	4.71	-4.38	4.68	0.35	-13.56	4.80
Pharmacist	-8.93	6.56	0.173	-21.79	3.93	-8.92	6.57	0.174	-21.80	3.95
Physician	-3.18	5.35	0.552	-13.66	7.30	-3.20	5.36	0.551	-13.70	7.31
Secretarial	-5.75	5.47	0.293	-16.47	4.97	-5.77	5.50	0.294	-16.54	5.01
Other	-1.99	5.22	0.703	-12.22	8.23	-2.00	5.23	0.702	-12.25	8.25
Job stress	-2.67	3.40	0.431	-9.33	3.99	-3.48	6.83	0.611	-16.90	9.95
FNWK	2.58	1.59	0.104	-0.53	5.70	1.96	4.93	0.691	-7.74	11.65
Interaction						0.58	4.28	0.892	-7.84	9.00

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; FNWK = Friendly non-work related communicaton

Table 13

Multiple regression of hostile or difficult communication and job stress predicting burnout

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	0.05	0.08	0.530	-0.11	0.21	0.10	0.08	0.224	-0.06	0.26
Age	**-0.01**	0.00	0.049	-0.02	0.00	-0.01	0.00	0.063	-0.02	0.00
Jtenure	-0.01	0.01	0.272	-0.02	0.01	-0.01	0.01	0.358	-0.02	0.01
Otenure	0.00	0.01	0.850	-0.01	0.01	0.00	0.01	0.703	-0.01	0.02
Ptenure	0.00	0.00	0.884	-0.01	0.01	0.00	0.00	0.915	-0.01	0.01
Sex	0.08	0.06	0.219	-0.05	0.20	0.08	0.06	0.166	-0.04	0.20
aian	**-0.86**	0.29	0.003	-1.42	-0.30	**-0.59**	0.30	0.047	-1.17	-0.01
asian	0.08	0.17	0.644	-0.25	0.40	0.12	0.16	0.453	-0.20	0.44
aa	-0.09	0.07	0.178	-0.23	0.04	-0.06	0.07	0.387	-0.19	0.08
other	-0.15	0.14	0.280	-0.42	0.12	-0.17	0.13	0.205	-0.43	0.09
Micro	0.17	0.12	0.180	-0.08	0.41	0.12	0.12	0.311	-0.12	0.36
Small	-0.07	0.07	0.328	-0.22	0.07	-0.05	0.07	0.479	-0.20	0.09
Medium	-0.01	0.06	0.930	-0.13	0.12	-0.03	0.06	0.657	-0.15	0.09
Allied	0.07	0.10	0.477	-0.12	0.26	0.06	0.10	0.523	-0.13	0.25
Case manager	0.14	0.13	0.293	-0.12	0.39	0.10	0.13	0.450	-0.16	0.35
Dentist	0.14	0.16	0.399	-0.18	0.45	0.10	0.16	0.546	-0.22	0.41
Housekeeping	0.17	0.18	0.322	-0.17	0.52	0.19	0.17	0.271	-0.15	0.52
Mental	-0.09	0.10	0.369	-0.28	0.11	-0.10	0.10	0.307	-0.29	0.09
Nursing	0.05	0.09	0.563	-0.12	0.22	0.03	0.09	0.691	-0.14	0.20
Pharmacist	-0.06	0.12	0.628	-0.30	0.18	-0.05	0.12	0.705	-0.28	0.19
Physician	0.17	0.10	0.093	-0.03	0.36	0.13	0.10	0.176	-0.06	0.33
Secretarial	**0.21**	0.10	0.042	0.01	0.41	0.17	0.10	0.083	-0.02	0.37
Other	-0.08	0.10	0.440	-0.28	0.11	-0.10	0.10	0.282	-0.30	0.09
Job stress	**0.45**	0.06	<.001	0.33	0.58	**0.32**	0.08	<.001	0.16	0.47
Host/diff	**0.11**	0.04	0.006	0.03	0.19	-0.20	0.11	0.074	-0.41	0.02
Interaction						**0.29**	0.10	0.003	0.10	0.48

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Host/diff= Hostile or difficult communicaton

Table 14

Multiple regression of hostile or difficult communication and job stress predicting physical functioning

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	7.90	4.82	0.101	-1.55	17.36	6.84	4.90	0.163	-2.77	16.45
Age	-0.48	0.25	0.058	-0.98	0.02	-0.50	0.25	0.052	-0.99	0.00
Jtenure	**-0.72**	0.35	0.039	-1.40	-0.04	**-0.74**	0.35	0.033	-1.43	-0.06
Otenure	0.06	0.39	0.876	-0.70	0.82	0.03	0.39	0.932	-0.72	0.79
Ptenure	0.21	0.26	0.408	-0.29	0.71	0.21	0.26	0.416	-0.29	0.71
Sex	-3.74	3.69	0.310	-10.97	3.48	-3.91	3.68	0.288	-11.13	3.31
Aian	-2.30	16.96	0.892	-35.55	30.95	-8.34	17.71	0.638	-43.05	26.38
Asian	2.47	9.78	0.801	-16.71	21.64	1.47	9.81	0.881	-17.76	20.70
Aa	4.91	4.04	0.225	-3.02	12.84	4.17	4.10	0.309	-3.86	12.20
Other	5.96	8.09	0.461	-9.89	21.81	6.47	8.09	0.424	-9.38	22.32
Micro	3.49	7.44	0.639	-11.09	18.08	4.45	7.47	0.552	-10.20	19.10
Small	-6.39	4.47	0.153	-15.15	2.37	-6.84	4.47	0.126	-15.59	1.92
Medium	-5.40	3.72	0.147	-12.70	1.90	-4.91	3.75	0.190	-12.27	2.44
Allied	**11.57**	5.77	0.045	0.27	22.88	**11.74**	5.77	0.042	0.44	23.05
CM	-14.76	7.71	0.056	-29.88	0.35	-13.88	7.74	0.073	-29.06	1.30
Dentist	-13.96	9.33	0.135	-32.26	4.33	-13.11	9.34	0.160	-31.41	5.19
HK	-9.35	10.29	0.364	-29.53	10.83	-9.70	10.29	0.346	-29.86	10.46
Mental	4.54	5.91	0.442	-7.04	16.12	4.76	5.90	0.420	-6.81	16.32
Nursing	-6.19	5.22	0.236	-16.42	4.05	-5.83	5.22	0.264	-16.07	4.40
Pharmacist	-7.97	7.28	0.274	-22.24	6.30	-8.29	7.28	0.254	-22.56	5.97
Physician	8.99	6.00	0.135	-2.78	20.75	9.72	6.05	0.108	-2.14	21.58
Secretarial	0.39	6.04	0.948	-11.45	12.23	1.13	6.04	0.851	-10.70	12.97
Other	-0.71	5.78	0.902	-12.05	10.62	-0.26	5.80	0.964	-11.63	11.10
Job stress	5.07	3.71	0.172	-2.21	12.35	8.18	4.57	0.074	-0.78	17.14
Host/diff	**-9.94**	2.42	<.001	-14.69	-5.20	-3.15	6.42	0.623	-15.75	9.44
Interaction						-6.46	5.67	0.254	-17.58	4.65

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Host/diff= Hostile or difficult communicaton

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Table 15

Multiple regression of hostile or difficult communication and job stress predicting role limitations

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	-4.08	7.56	0.589	-18.91	10.74	-2.60	7.73	0.737	-7.74	12.54
Age	0.09	0.41	0.835	-0.73	0.90	0.11	0.41	0.799	-0.71	0.92
Jtenure	-0.37	0.55	0.449	-1.44	0.70	-0.34	0.55	0.538	-1.41	0.74
Otenure	0.06	0.60	0.924	-1.12	1.24	0.10	0.61	0.876	-1.09	1.28
Ptenure	0.36	0.41	0.373	-0.44	1.16	0.37	0.41	0.368	-0.43	1.17
Sex	2.59	5.81	0.655	-8.80	13.99	2.82	5.81	0.627	-8.57	14.22
Aian	**-70.54**	34.82	0.045	-139.59	-1.49	-62.34	34.15	0.070	-129.81	5.12
Asian	-4.19	15.48	0.787	-34.54	26.16	-2.80	15.52	0.857	-33.22	27.62
Aa	0.12	6.40	0.985	-12.43	12.67	1.18	6.48	0.856	-11.53	13.88
Other	8.87	12.74	0.486	-16.10	33.85	8.15	12.77	0.523	-16.88	33.18
Micro	3.54	11.94	0.767	-19.87	26.95	2.24	11.92	0.851	-21.13	25.61
Small	6.52	6.92	0.347	-7.06	20.09	7.10	6.96	0.308	-6.54	20.74
Medium	-2.00	5.82	0.731	-13.40	9.41	-2.68	5.86	0.647	-14.18	8.82
Allied	4.76	9.11	0.601	-13.09	22.62	4.49	9.13	0.623	-13.40	22.37
CM	-4.77	12.12	0.694	-28.52	18.98	-6.00	12.18	0.622	-29.88	17.87
Dentist	-13.73	14.64	0.348	-42.42	14.96	-14.87	14.66	0.311	-43.61	13.87
HK	3.79	16.22	0.815	-28.01	35.58	4.22	16.23	0.795	-27.58	36.02
Mental	-5.59	9.16	0.542	-23.55	12.37	-5.94	9.18	0.518	-23.92	12.05
Nursing	-3.11	8.20	0.704	-19.19	12.97	-3.63	8.23	0.659	-19.75	12.50
Pharmacist	2.20	11.47	0.848	-20.27	24.68	2.62	11.47	0.820	-19.87	25.10
Physician	10.49	9.67	0.278	-8.47	29.45	9.46	9.74	0.332	-9.65	28.57
Secretarial	8.33	9.57	0.384	-10.43	27.10	7.29	9.68	0.452	-11.68	26.25
Other	5.07	9.11	0.578	-12.78	22.93	4.43	9.14	0.628	-13.49	22.34
Job stress	**-21.44**	6.45	0.001	-34.13	-8.74	**-25.68**	8.46	0.003	-42.37	-8.98
Host/diff	**-18.96**	3.84	<.001	-26.50	-11.43	**-28.25**	10.74	0.009	-49.35	-7.15
Interaction						8.86	9.58	0.356	-9.96	27.67

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Host/diff= Hostile or difficult communicaton

Table 16

Multiple regression of friendly non work related communication and job stress predicting bodily pain

	B	SE	P value	CI LL	CI UL	B	SE	P value	CI LL	CI UL
Ethnicity	4.98	4.45	0.263	-3.74	13.71	4.90	4.58	0.285	-4.08	13.89
Age	-0.39	0.23	0.086	-0.84	0.06	-0.39	0.23	0.086	-0.84	0.06
Jtenure	-0.19	0.32	0.542	-0.82	0.43	-0.20	0.32	0.540	-0.82	0.43
Otenure	0.30	0.35	0.386	-0.38	0.99	0.30	0.35	0.396	-0.39	0.99
Ptenure	0.07	0.23	0.757	-0.39	0.53	0.07	0.23	0.756	-0.39	0.53
Sex	-4.59	3.34	0.169	-11.14	1.96	-4.61	3.34	0.168	-11.16	1.95
Aian	-23.42	15.49	0.131	-53.79	6.94	-23.98	16.45	0.145	-56.23	8.27
Asian	-0.86	8.97	0.924	-18.44	16.73	-0.90	9.03	0.920	-18.60	16.79
Aa	-0.60	3.73	0.873	-7.91	6.72	-0.65	3.80	0.865	-8.09	6.80
Other	1.30	7.41	0.861	-13.23	15.82	1.37	7.45	0.855	-13.24	15.97
Micro	3.55	6.71	0.597	-9.61	16.71	3.64	6.80	0.592	-9.69	16.97
Small	-4.12	4.14	0.319	-12.24	4.00	-4.15	4.15	0.317	-12.29	3.99
Medium	-0.17	3.45	0.961	-6.94	6.60	-0.13	3.51	0.972	-7.01	6.76
Allied	-6.68	5.31	0.209	-17.08	3.73	-6.68	5.32	0.209	-17.10	3.74
CM	**-16.92**	7.08	0.017	-30.81	-3.04	**-16.86**	7.12	0.018	-30.82	-2.90
Dentist	-8.70	8.58	0.310	-25.51	8.11	-8.67	8.62	0.315	-25.56	8.23
HK	**-19.88**	9.46	0.036	-38.43	-1.34	**-19.93**	9.49	0.036	-38.53	-1.32
Mental	-3.54	5.41	0.513	-14.15	7.07	-3.53	5.42	0.515	-14.15	7.10
Nursing	-5.13	4.85	0.290	-14.64	4.38	-5.11	4.85	0.292	-14.21	4.40
Pharmacist	-11.94	6.70	0.075	-25.07	1.19	-11.98	6.72	0.075	-25.16	1.19
Physician	-1.73	5.51	0.754	-12.52	9.07	-1.70	5.42	0.759	-12.56	9.17
Secretarial	-4.50	5.59	0.420	-15.46	6.45	-4.40	5.60	0.433	-15.37	6.58
Other	-1.99	5.38	0.712	-12.53	8.56	-1.98	5.39	0.714	-12.55	8.59
Job stress	2.72	3.36	0.419	-3.88	9.31	3.01	4.35	0.489	-5.52	11.54
Host/diff	**-10.21**	2.22	<.001	-14.56	-5.85	-9.60	6.25	0.125	-21.86	2.66
Interaction						-0.57	5.51	0.918	-11.38	10.25

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Host/diff= Hostile or difficult communicaton

Table 17

Multiple regression of friendly non work related communication and job stress predicting general health

	B	SE	P value	CI LL	CI UL		B	SE	P value	CI LL	CI UL
Ethnicity	-1.32	4.40	0.765	-9.93	7.30		-3.36	4.43	0.448	-12.05	5.32
Age	-0.29	0.23	0.201	-0.74	0.16		-0.32	0.23	0.157	-0.76	0.12
Jtenure	0.27	0.32	0.390	-0.35	0.90		0.23	0.32	0.473	-0.39	0.84
Otenure	0.02	0.35	0.966	-0.67	0.70		-0.04	0.35	0.915	-0.72	0.64
Ptenure	0.31	0.23	0.183	-0.14	0.75		0.30	0.23	0.187	-0.15	0.74
Sex	-3.51	3.33	0.291	-10.04	3.01		-3.85	3.28	0.241	-10.29	2.59
Aian	-12.80	15.37	0.405	-42.94	17.33		-24.37	15.98	0.127	-55.68	6.95
Asian	-4.33	8.89	0.626	-21.70	13.05		-6.26	8.79	0.477	-23.48	10.97
Aa	2.30	3.67	0.530	-4.88	9.49		0.85	3.67	0.817	-6.35	8.05
Other	4.58	7.32	0.531	-9.76	18.92		5.55	7.25	0.444	-8.66	19.76
Micro	4.76	6.81	0.484	-8.58	18.11		6.59	6.75	0.329	-6.64	19.82
Small	2.82	4.01	0.482	-5.05	10.69		1.95	3.97	0.623	-5.83	9.73
Medium	-0.96	3.29	0.771	-7.41	5.49		-0.04	3.30	0.992	-6.50	6.43
Allied	-0.54	5.22	0.918	-10.77	9.69		-0.19	5.16	0.970	-10.31	9.92
CM	**-18.20**	6.98	0.009	-31.89	-4.52		**-16.50**	6.93	0.017	-30.07	-2.93
Dentist	-14.71	8.38	0.079	-31.13	1.71		-13.10	8.30	0.115	-29.38	3.17
HK	-6.75	9.35	0.470	-25.07	11.57		-7.40	9.23	0.422	-25.49	10.68
Mental	**-12.04**	5.32	0.024	-22.47	-1.60		**-11.61**	5.26	0.027	-21.91	-1.31
Nursing	-1.73	4.71	0.713	-10.97	7.50		-1.03	4.66	0.825	-10.16	8.10
Pharmacist	-8.27	6.61	0.211	-21.21	4.68		-8.88	6.52	0.173	-21.66	3.91
Physician	-1.82	5.40	0.736	-12.40	8.77		-0.41	5.38	0.939	-10.95	10.13
Secretarial	-6.94	5.39	0.198	-17.51	3.62		-5.52	5.38	0.305	-16.07	5.02
Other	-2.93	5.18	0.572	-13.08	7.23		-2.05	5.14	0.690	-12.12	8.02
Job stress	-3.40	3.36	0.311	-9.99	3.18		2.56	4.23	0.545	-5.73	10.58
Host/diff	-3.00	2.29	0.191	-7.49	1.50		10.04	6.03	0.096	-1.80	21.87
Interaction							**-12.42**	5.28	0.019	-22.78	-2.05

Note. Bold = significant finding; m = 20; Jtenure = job tenure; Otenure = organizational tenure; Ptenure = Professional tenure; Aian = Alaskan Indian Alaskan Native; Aa = Black or African American; CM = Case manager; HK = Housekeeping; Host/diff= Hostile or difficult communicaton
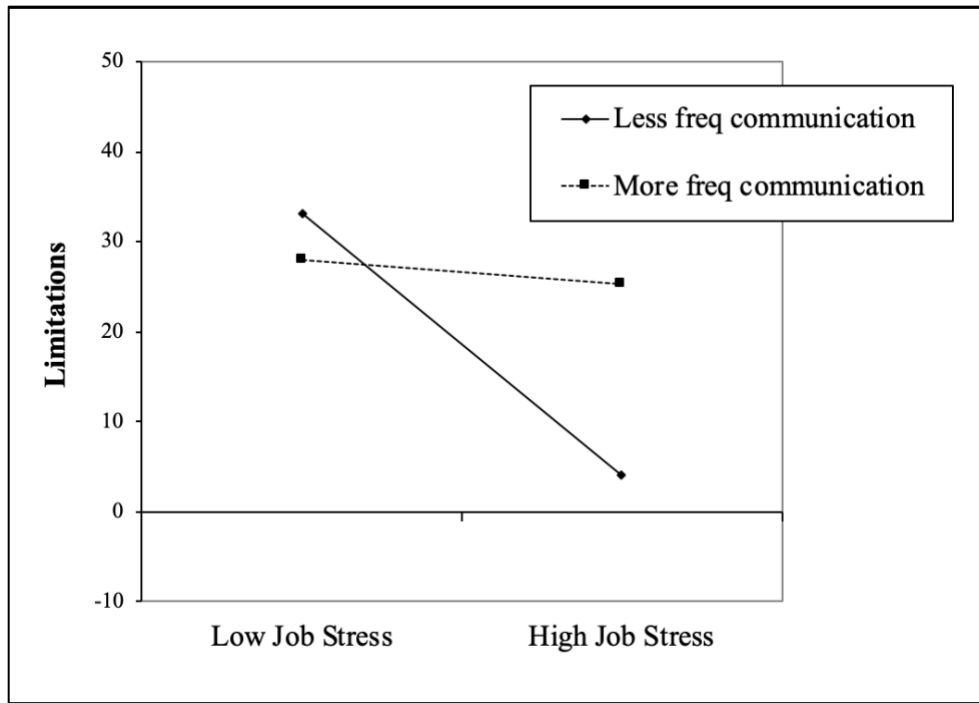
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Figure 1. Interaction effects of friendly work-related communication on the associations between job stress and health outcomes: role limitations
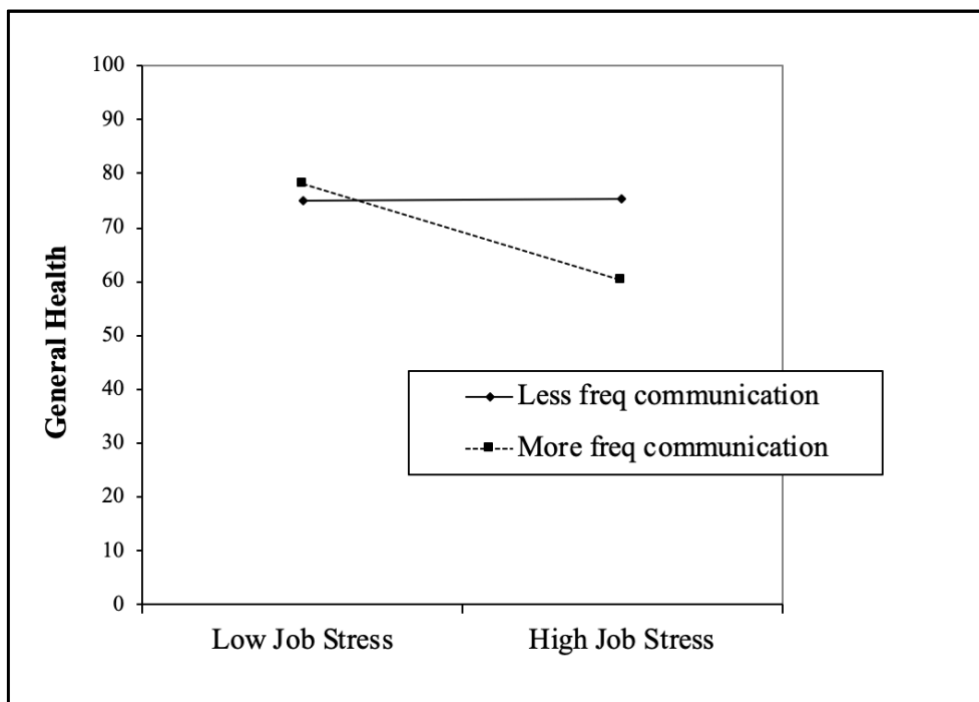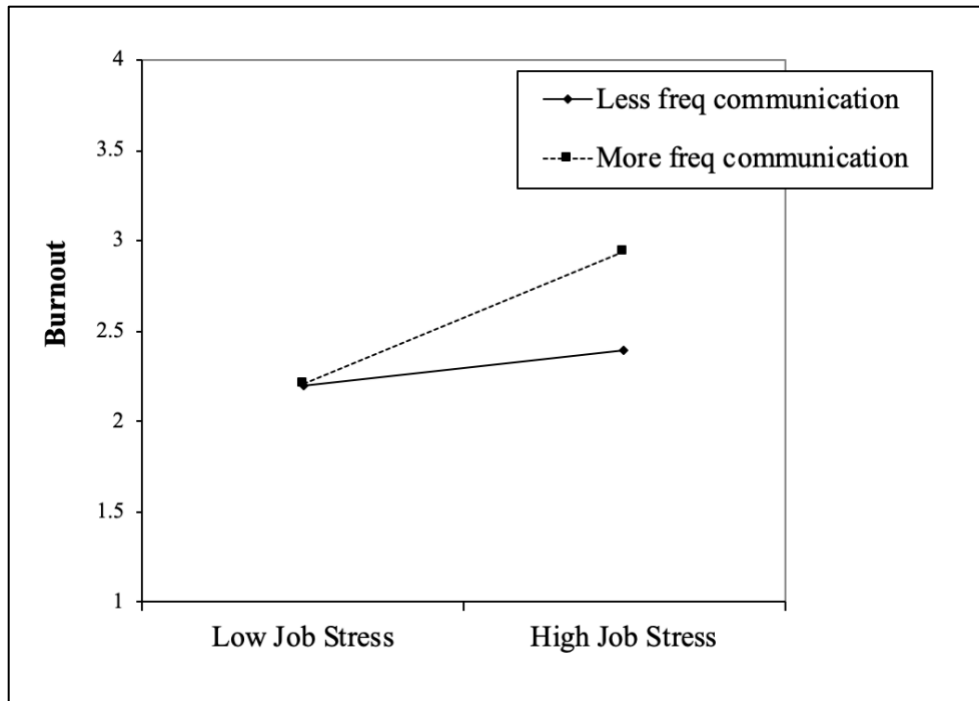
Figure 2. Interaction effects of hostile or difficult communication on the associations between job stress and health outcomes: burnout (top) and general health (bottom).

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CHAPTER 6:

HEALTHCARE EMPLOYEES' HEALTH AND WELLBEING WITH WORKPLACE

INTERPERSONAL RELATIONSHIPS: CONTRIBUTIONS AND RECOMMENDATIONS

To advance existing initiatives for healthcare employees' health and wellbeing, it is important to explain how new research builds on existing movements and to translate findings into practical recommendations. In this chapter, there is (a) a review of previous dissertation chapters, (b) a discussion of Medical Family Therapy's influence on this dissertation, (c) an appraisal of this dissertation's contributions to science for healthcare employees' health and wellbeing, (d) research recommendations for using social network theory to advance national movements, (e) an identification of at-risk populations with a fact sheet for dissemination to organizations and employees, and (f) practice recommendations for at-risk populations.

Dissertation Review

In chapter one, the Triple Aim framework was introduced in order to provide a framework to help organizations improve health care by attending to population health, patients' experience of care, and per capita cost for healthcare patient care (Institute of Healthcare Improvement, 2018). Unfortunately, the strategies being implemented to address the Triple Aim neglect an important component of healthcare: the health and wellbeing of the employees within these organizations. The Quadruple Aim was introduced as a means of including this integral component (i.e., healthcare employees' health and wellbeing) into the equation of providing high quality, affordable health care (Bodenheimer & Sinsky, 2014). Thus, the purpose of this dissertation was to explore the role of workplace interpersonal relationships for healthcare employees' health and wellbeing in order to develop practical implications and recommendations for addressing the Quadruple Aim.

Chapter one of this dissertation provided background on the Triple Aim initiative and explained the reasoning behind transitioning to the Quadruple Aim by adding an aim that attends to preserving healthcare employees' health and wellbeing (Bodenheimer & Sinsky, 2014). Chapter two is a literature review that introduced social network theory (Kadushin, 2012) as a framework for conceptualizing the associations between workplace interpersonal relationships and healthcare employees' health outcomes (i.e., burnout and physical health), which is needed to address the gap in understanding about the causal effects of workplace interpersonal relationships in healthcare (Welp & Manser, 2016). In chapter three, a systematic review identified that when researchers used social network analysis to explore how workplace interpersonal relationships are linked with employees' workplace health (i.e., physical, mental, and social health; Burton, 2014), outcomes of social health were most often examined with some exploration of mental health and almost no investigation of the association between workplace interpersonal relationships and employees' physical health. These results were important because they demonstrated that researchers were examining the effects of workplace interpersonal relationships on workplace health using relational data using social network analysis; however, the outcomes that are most costly for employees and organizations (i.e., employees' health) had not yet been investigated.

Consequently, chapter four presented the methodology for original research that was designed based on social network theory to explore how healthcare employees' interpersonal relationships in the workplace interact with job stress to change the association between job stress and employees' burnout and physical health. In chapter five, the results of the original research study were presented that friendly, work-related and hostile or difficult communication changed the association between job stress and employees' health (i.e., burnout, role limitations,

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and general health). More frequent friendly work-related communication was beneficial to employees' health during instances of low job stress and more frequent hostile or difficult communication was detrimental to employees' health when job stress was high. These results help advance the understanding of when interpersonal relationships are beneficial or detrimental, which can be used to inform national initiatives to improve employees' health and wellbeing (i.e., Quadruple Aim; team-based care; Bodenheimer & Sinsky, 2014; Smith et al., 2018). An explanation of how a background in Medical Family Therapy was pivotal in establishing this dissertation research is provided in the next section.

Influences of Medical Family Therapy

A main goal for the Medical Family Therapy (MedFT) field is to improve health care. One of the main competency domains for being a MedFT is collaboration, defined as working cooperatively with others to maximize benefits of team-based care, research, policy, work, and training (American Association for Marriage and Family Therapists, 2017); thus it was a natural fit to examine interpersonal communication in health care. Training in both the educational foundation (i.e., System's Theory, biopsychosocial model; public health theories, and relational science; Engel, 1977; 1980; von Bertalanffy, 1968) and practical experiences (i.e., integrated health care) of MedFT assisted with developing the research questions, designing the methodology, interpreting the results, and translating the findings. Having the theoretical guidance of system's theory, training in relational science, and having practical experience in relational therapy influenced the questions that formed about the systemic impact of interdisciplinary interactions (or lack thereof). More specifically, questioning that (a) positive changes in one part of the system does not guarantee positive change across the system (i.e., better patient outcomes with more collaboration does not guarantee better employee outcomes),

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(b) individual employees will be affected by interpersonal communication differently based on their unique characteristics (e.g., job responsibilities, age, job tenure, personality, culture, background), and (c) due to individual differences in personality, background, and training employees will vary in their skills at communicating effectively which can impact the *process* of communication (i.e., if it is hostile vs friendly vs neutral). Thus, as a medical family therapist, I felt compelled to contribute to science by delving deeper into the costs and benefits of workplace interdisciplinary communication for healthcare employees and translating these findings into future research recommendations and implications for national movements with the goal of promoting high quality, affordable health care.

Contributions to Science for Healthcare Employees' Health and Wellbeing

This dissertation focused on the role of workplace interpersonal relationships in understanding employees' health and wellbeing, using the lens of social network theory (Kadushin, 2012). The main contributions to science included (a) presenting a theory (i.e., social network theory; Kadushin, 2012) and methodology (i.e., social network analysis; Scott, 2017) to guide future science for workplace interpersonal relationships and employees' health, (b) identifying the major gap in research about the associations between workplace interpersonal relationships and essential workplace health outcomes (i.e., physical and mental health outcomes), and (c) presenting original research informed by social network theory (Kadushin, 2012) that helped address the gap by examining how workplace interpersonal relationships changed the association between job stress and employees' health outcomes (i.e., burnout and physical health).

Theory and Methodology

Theory and methodology for workplace interpersonal research were informed by multiple dissertation chapters. The literature review presented a way to conceptualize the links between workplace interpersonal relationships and employee health by using social network theory (Kadushin, 2012) and introduced a relational methodology in social network analysis (Scott, 2017). The systematic review synthesized 50 studies (from a sample of 3, 289 quantitative studies) that examined the associations between workplace interpersonal relationships and employees' health (i.e., physical, mental, or social health) using social network analysis (Scott, 2017), a primary methodology for social network theory (Kadushin, 2012). The synthesized results highlighted that different types of relationships (e.g., friendship, advice) exist within one workplace and each has differential associations with workplace health outcomes (e.g., patient safety handling practices, emotions or affect, interpersonal citizenship behaviors). The literature review and systematic review papers helped synthesized known information and introduce a way to research workplace interpersonal relationships, but also contributed to science by highlighting a gap in the literature regarding what is missing in social network and employee health research.

Gap in Literature

The examination of past literature that used social network analysis revealed that most researchers have focused on friendship and advice networks with less of a focus on alternative types of networks, including instrumental (e.g., cooperation, communication) and expressive networks (e.g., avoidance/difficulty, positive affect). The limited focus restricted what is known about the impact of interpersonal relationships to only a few types of interactions when there are actually many overlapping types of interactions within workplaces. When examining employee health outcomes (tied to workplace interpersonal relationships) using social network analysis,

there was robust evidence for the association between workplace interpersonal relationships and employees' social health; however, there was a chasm in the research on employees' mental health and research was nearly nonexistent on employee physical health. Key conditions for preserving employees' health and wellbeing (e.g., high blood pressure, heart attack, diabetes, pain, fatigue, stress, anxiety, or depression) and reducing costs (e.g., insurance, turnover costs) were neglected from past research. Consequently, the original research study was designed to help address this gap.

Original Research

An original research study was conducted that investigated how multiple types of workplace interpersonal relationships (i.e., friendly work-related, friendly non-work-related, hostile/difficult) were associated with key health risk-factors for healthcare employees, specifically burnout and physical health (i.e., physical functioning, role limitations, bodily pain, general health). This study put forth additional contributions to science by providing evidence that addressed the previously noted gap in literature; specifically, that workplace interpersonal relationships were associated with healthcare employees' mental health (i.e., job stress, burnout) and physical health (i.e., physical functioning, role limitations, bodily pain, general health). Furthermore, the findings showed that the associations between job stress and employees' mental (i.e., burnout) and physical health (i.e., physical functioning, role limitations, bodily pain, general health) outcomes depended on workplace interpersonal relationships. Thus, these results provided evidence that workplace interpersonal relationships need to be incorporated into future research or workplace programs for healthcare employees' health and wellbeing. Future research recommendations and practical implications were developed for current national movements that aim to preserve healthcare employees' health and wellbeing.

Future Research for National Movements

The findings from this dissertation point to new avenues for the Quadruple Aim (i.e., attend to population health, patients' experience of care, per capita cost, preserve healthcare providers' health and wellbeing; Bodenheimer & Sinsky, 2014) and National Academy of Medicine's focus on team-based care (Smith et al., 2018). Future research about these two national movements should incorporate workplace interpersonal relationships by using social network analysis. While researchers previously identified that workplace social networks are beneficial for patient care, workflow efficiency, and dissemination of information (Chambers et al., 2012), the literature lacks information about employees' health and wellbeing. This gap is an issue for the business model of health care as the World Health Organization identified employees' health and wellbeing (e.g., lifestyle habits, disabilities and injuries, job stress) as a central component for maintaining business success rather than failure. According to the WHO's business model, employees' health and wellbeing are linked with organizational productivity (e.g., absenteeism, presenteeism, turnover) and financial costs (e.g., worker's compensation, turnover, insurance, and disability; Burton, 2014). Incorporating social network analysis into future research provides a way for researchers to examine the causal impact of workplace interpersonal relationships on the productivity and financial outcomes for the Quadruple Aim (Bodenheimer & Sinsky, 2014).

Additionally, the National Academy of Medicine's national movement to utilize team-based care to improve clinician wellbeing (i.e., reduce burnout) would benefit from social network theory (Kadushin, 2012) and/or social network analysis (Scott, 2017). Social network theory provides a theoretical foundation to ground future research on team-based care and social network analysis should be used to empirically test the benefits of team-based care on healthcare

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employees' health and wellbeing. For example, social network theory and social network analysis should be used to explore whether the characteristics of a successful team are present. The Academy of Medicine defined successful interdisciplinary teams as ones with (a) clear and compelling purpose and goals, (b) enabling social structure that facilitates teamwork, (c) supportive organizational context, and (d) expert team coaching (Smith et al., 2018). Social network analysis offers methods to measure dyadic and triadic interactions through electronic (e.g., email, text message), roster, or free-responses data collection methods (Scott, 2017). This information can then be used to quantify patterns of connections, strength of relationships, frequency of communication, and the larger social network structure (e.g., supportive, hostile, friendships). Thus, three of the four characteristics of successful teams (i.e., effects of the social structure of the workplace, level of support within organization, and effects of team coaching; Smith et al., 2018) can be quantified using social network analysis and empirically examined in relation to healthcare employees' health and wellbeing. An empirical exploration of successful team traits would provide evidence to substantiate a theoretical foundation for team-based care, which is currently needed to advance science. It would also be beneficial to have a greater understanding about the populations who are most at-risk for poor mental and physical health outcomes.

Identification of At-Risk Populations and Practice Recommendations

Workplace programs aimed at improving healthcare employees' health and wellbeing would benefit from knowing what type of employee is at-risk for poor health and wellbeing. Taking an in-depth look at the differences in employees' burnout and physical health based on demographic characteristics provided additional information on who is most at-risk. Using the sample from this dissertation, analyses (i.e., one way ANOVAs, t-tests, correlations) indicated

that a variety of demographic characteristics should be considered. First, results showed that healthcare employees from a variety of professions reported varying levels of burnout (F (10, 226) = 2.51, p = .007) and hostile or difficult communication (F (10, 210) = 6.39, p < .001). Physicians (n = 26, m = 2.57, sd = .33) reported higher levels of burnout than administration/leadership (n = 35, m = 2.20, sd = .48) and other (n = 25, m = 2.16, sd = .40). Regarding hostile or difficult communication, administrative/leadership had lower frequency (n = 33, m = .36, sd = .47) than allied health therapists (n = 23, m = 1.13, sd = .95), dentists (n = 6, m = 1.45, sd = .52), nurses (n = 43, m = .95, sd = .90), and physicians (n = 23, m = 1.15, sd = .71). Pharmacists (n = 13, m = 1.38, sd = .77) reported higher levels of hostile or difficult communication than secretarial employees (n = 17, m = .41, sd = .76), administrative/leadership, and other. Additionally, employees who chose 'other' (n = 21, m = .14, sd = .67) had lower frequency of hostile or difficult communication than allied health therapists, case managers (n = 10, m = 1.08, sd = .71), dentists, housekeepers (n = 5, m = 1.43, sd = .75), nurses, and physicians. Healthcare employees' age and professional tenure (i.e., years in the profession) were also identified as important indicators for risk status for burnout, hostile or difficult communication, and role limitations (e.g., accomplishing less that you would like, difficulty performing work). Results showed younger employees were at more risk for higher levels of burnout (r = -.28, p < .001), more frequent hostile or difficult communication (r = -.31, p < .001), and worse role limitations (r = .24, p < .001) than older employees. Additionally, employees who were newer to their profession reported higher levels of burnout (r = -.25, p < .001), more frequent hostile or difficult communication (r = -.21, p = .002), and worse role limitations (r = .20, p = .003) than employees with longer professional tenures. Overall, younger employees who were newer to

their profession were more at-risk for worse physical health (i.e., role limitations), mental health (i.e., burnout), and social health (i.e., hostile or difficult communication).

Additionally, size of organization was an important indicator for hostile or difficult communication (F (3, 216) = 26.34 , $p < .001$, physical functioning (F (3, 224) = 9.13, $p < .001$), and role limitations (F (3, 226) = 6.40, $p < .001$). Employees from large organizations ($n = 90$, m = .37, $sd = .55$) reported less frequent hostile or difficult communication than employees in medium ($n = 68$, $m = 1.03$, $sd = 0.77$) and small organizations ($n= 51$, $m = 1.38$, $sd = .87$). Employees from large organizations also had better physical functioning ($n = 96$, $m = 83.76$, $sd = 19.77$) and fewer role limitations ($n = 97$, $m = 76.20$, $sd = 32.96$) than employees in medium (physical functioning $n = 70$, $m = 70.59$, $sd = 26.48$; role limitations $n = 71$, $m = 57.04$, $sd = 36.75$) and small organizations (physical functioning $n = 51$, $m = 65.31$, $sd = 23.11$; role limitations $n = 53.92$, 35.13). Overall, these results indicated that employees working in medium and small organizations are more at-risk for having (a) hostile or difficult conversations with coworkers, (b) limitations in physically demanding activities of daily living (e.g., walking a few blocks, climbing stairs, bending or kneeling, participating in moderate or vigorous physical activities), and (c) difficulty achieving, accomplishing, or were limited in tasks for work and other daily activities because of physical health. It is noteworthy that employees in medium and small organizations were at-risk for worse physical health issues and for their physical health becoming a barrier to accomplishing daily tasks, including work. To assist with disseminating these findings about at-risk populations, a fact sheet was prepared (see Figure 1). Based on the dissertation results and these additional risk factors, the following practice recommendations were developed:

1. Organizational programs should be offered to address burnout and manage hostile or difficult communication with coworkers for all healthcare employees regardless of job type.

2. Graduate training programs should develop curriculum to help students prepare for the demands and stressors of a career in healthcare by helping them establish strategies to preserve their mental and physical health before they transition into becoming employees.

3. Organizational programs should be offered to assist younger employees who are newer to their profession with navigating potentially difficult or hostile conversations with coworkers (e.g., salary, promotions, differences of opinion, burnout, wellbeing).

4. Professional state and national organizations should develop specific strategies for supporting healthcare employees who work in small and medium sized healthcare organizations across different job types.

5. Large healthcare organizations that also operate medium or small satellite locations should offer resources for navigating potentially difficult or hostile conversations with coworkers (e.g., salary, promotions, differences of opinion, wellbeing) that are uniquely designed for being effective in small and medium sized locations rather than offering the same resources across all locations.

6. Large healthcare organizations that also operate medium or small satellite locations should offer resources for establishing strategies to preserve employees' mental and physical health that are uniquely designed for being effective in small and medium sized locations rather than offering the same resources across all locations.
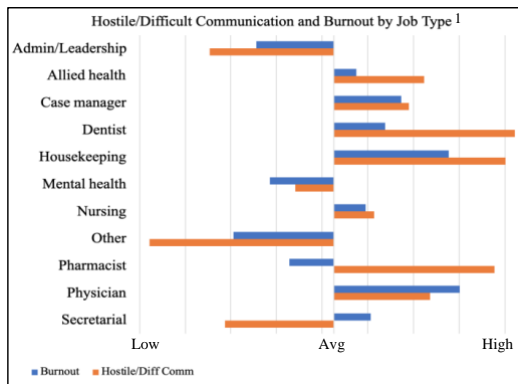
Summary

This dissertation focused on advancing the Quadruple Aim by investigating how workplace interpersonal relationships were associated with healthcare employees' health and wellbeing, using social network theory. With trends indicating healthcare employees' health and wellbeing are deteriorating and will compromise the quality and affordability of health care, it was imperative to investigate innovative ways to address this epidemic. Despite the World Health Organization and National Academy of Medicine both identifying workplace interpersonal relationships as influential for employees' health and wellbeing, there was a dearth of research in this area. This dissertation contributed to science by helping address this gap in the literature, translating the findings into future research recommendations for national movements, and offering practical implications for at-risk populations. Workplace interpersonal relationships should continue to be incorporated into strategies to achieve high quality, affordable healthcare.
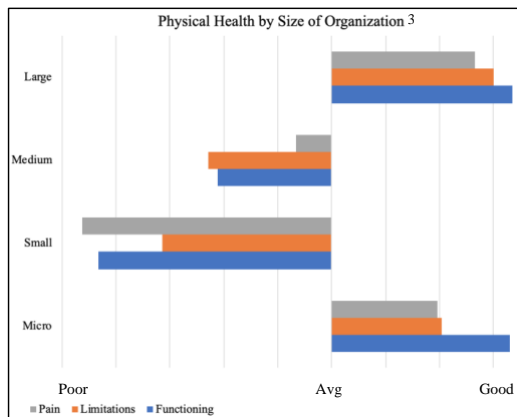
# UNDERSTANDING HEALTHCARE EMPLOYEES' BURNOUT AND PHYSICAL HEALTH

FACT SHEET

Hostile/Difficult Communication and Burnout by Job Type [1]

Job Types (top to bottom): Admin/Leadership, Allied health, Case manager, Dentist, Housekeeping, Mental health, Nursing, Other, Pharmacist, Physician, Secretarial

Scale: Low — Avg — High

Legend: ■ Burnout ■ Hostile/Diff Comm

N = 237

Physical Health by Size of Organization [3]

Categories (top to bottom): Large, Medium, Small, Micro

Scale: Poor — Avg — Good

Legend: ■ Pain ■ Limitations ■ Functioning

N = 237; Pain = bodily pain; Limitations = role limitations (example: difficulty performing work); Functioning = physical functioning (example: bending, kneeling)

1. Healthcare employees in *many different* jobs experience burnout and hostile or difficult communication.

2. More frequent hostile or difficult communication *increases risk* for burnout and poor health.**

3. Employees in *small* (10-49 employees) and *medium* (50-249 employees) organizations are more *at-risk* than employees in *large* (250+ employees) organizations for poor health and hostile or difficult communication.**

Comparison of Hostile or Difficult Communication by Organization Size [3]

Micro 11%, Small 44%, Medium 33%, Large 12%

Legend: ■ Micro ■ Small ■ Medium ■ Large
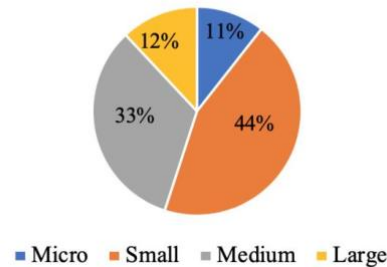
Employees who are **younger**** and **newer to their profession*** are more *at-risk* for experiencing:

Burnout
(disengaged, exhausted)

Hostile or Difficult Communication
(For example, regarding patient care, salary, or promotions)

Role Limitations
(limitations at work, doing less than you'd like, difficulty performing work)

Figure 1. Fact sheet

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Do you work in Health Care?
Participants needed for study on employee health

Attention all Healthcare Employees!
There is an <u>epidemic in healthcare</u>!

The workplace is taking a toll on the health and wellbeing of people who choose to dedicate their lives to helping others through taking jobs in health care. We need to do more to maintain the health and wellbeing of these important employees.

<u>How</u>
Complete an online survey about job stress, burnout, health, and workplace interpersonal relationships that will take 20-25 minutes. This survey is completely anonymous; no identifying information will be asked of you.

<u>Compensation</u>
The first 100 people to submit their finished survey will be entered to win $50 Amazon gift card. ALL people who submit a completed survey will be entered to win $25 Walmart gift card.

<u>Who</u>
All employees who work in health care, including, but not limited to:
- Physicians or prescribers
- Nurses
- Dentists
- Mental or behavioral health
- Housekeepers
- Secretarial
- Pharmacists
- Case managers
- Allied health therapists (physical, occupational, speech therapists)
- Administration or Leadership

<u>Next Steps</u>
- ☐ **USE** this link to take the survey:
  https://redcap.ecu.edu/surveys/?s=EJFJPLWFWL
- ☐ **SHARE** this flier to spread the word about this important research opportunity for healthcare employees.
- ☐ **VISIT**
  https://psnet.ahrq.gov/perspectives/perspective/190/burnout-among-health-professionals-and-its-effect-on-patient-safety to learn more about the rising rates of burnout in healthcare employees

Additional questions: contact Erin Sesemann at sesemanne16@students.ecu.edu
IRB #: UMCIRB 18-001675

Social Media Posts

Attention all Healthcare Employees! There is an epidemic in healthcare that is taking a toll on the health and wellbeing of people who dedicate their lives to helping others through these occupational roles. We need to do more to maintain the health and wellbeing of these important employees in health care!

We are striving to better understand what contributes to better health for employees in health care. If you are a healthcare employee in North Carolina, please consider taking this research survey about healthcare employees' burnout, job stress, workplace relationships, and physical health.

How?
Complete an online survey that will take 20-25 minutes. This survey is completely anonymous; no identifying information will be asked of you.

The _**first 100 people**_ who submit a finished survey will be entered to win $50 Amazon gift card.
**ALL people** who submit a completed survey will be entered to win $25 Walmart gift card.

USE this link to take the survey:
https://redcap.ecu.edu/surveys/?s=EJFJPLWFWL

IRB #: UMCIRB 18-001675
Additional questions: contact Erin Sesemann at sesemanne16@students.ecu.edu

APPENDIX C: IRB APPROVAL LETTER

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
www.ecu.edu/ORIC/irb

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Erin Sesemann
CC:
        Katharine Didericksen
        Erin Sesemann
Date: 3/11/2019
Re: UMCIRB 18-001675
        Employee health and workplace social networks

I am pleased to inform you that your research submission has been certified as exempt on 3/10/2019. This study is eligible for Exempt Certification under category #2A.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

APPENDIX D: INFORMED CONSENT

Dear Participant,

I am a student at East Carolina University in the department of Human Development and Family Science. I am asking you to take part in my research study entitled, *"Employees' Health in Health Care."*

The purpose of this research is to increase our understanding about what impacts healthcare employees' mental and physical health. By doing this research, I hope to learn how relationships with coworkers can reduce the impact of job stress and ultimately combat burnout and improve physical health. Your participation is completely voluntary.

You are being invited to take part in this research because you are a healthcare in North Carolina. The amount of time it will take you to complete this survey is 20-25 minutes.

If you agree to take part in this survey, you will be asked questions that relate to your job demands and rewards, job commitment and satisfaction, communication with your coworkers, and physical health.

The first 100 people who submit a completed survey will have the opportunity to enter into the drawing to win a $50 Amazon gift card and ALL people who submit a completed survey will have the will have the opportunity to enter into the drawing to win a $25 Walmart gift card.

This research is overseen by the University and Medical Center Institutional Review Board (UMCIRB) at East Carolina University. Therefore, some of the UMCIRB members or the UMCIRB staff may need to review your research data. However, the information you provide will not be linked to you. Therefore, your responses cannot be traced back to you by anyone, including me.

Identifiers might be removed from the identifiable private information and, after such removal, the information could be used for future research studies or distributed to another investigator for future research studies without additional informed consent from you or your Legally Authorized Representative (LAR). However, there still may be a chance that someone could figure out the information is about you.

If you have questions about your rights when taking part in this research, call the Office of Research Integrity & Compliance (ORIC) at 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, call the Director of Human Research Protections, at 252-744-2914.

You do not have to take part in this research, and you can stop at any time. If you decide you are willing to take part in this study, please continue with the survey.

Thank you for taking the time to participate in my research.

Sincerely,

Erin Sesemann
Principal Investigator

APPENDIX E: MEASURES

Demographics

1. What is your sex?
   a. Male
   b. Female
   c. Other
2. What is your race?
   a. American Indian or Alaskan Native
   b. Asian
   c. Black or African American
   d. Native Hawaiian or Other Pacific Islander
   e. White
   f. Other
3. Are you Hispanic or Latino?
   a. Yes
   b. No
4. What is your age?
5. Which profession most closely matches your own?
   a. Nursing
   b. Physician
   c. Allied health therapist (e.g., speech, occupational, physical therapies)
   d. Pharmacist
   e. Dentist
   f. Mental/Behavioral health
   g. Case manager
   h. Housekeeping
   i. Administration/Leadership
   j. Secretarial
   k. Other _____
6. How many years have you worked at your current job?
7. How many years have your worked for your current organization?
8. How many years have you been involved in your profession?
9. What is the zip code where your organization is located?
10. How many people are employed by your healthcare organization?

Predictor
Job Stress
Effort-Reward Imbalance Short Form (Siegrist, Li, & Montano, 2014)
1 = Strongly disagree
2 = Disagree
3 = Agree
4 = Strongly Agree
Effort and Rewards
1. I have constant time pressure due to a heavy workload.
2. I have many interruptions and disturbances while performing my job.
3. Over the past few years, my job has become more and more demanding.
4. I receive the respect I deserve from my superior or a respective relevant person.
5. My job promotion prospects are poor.
6. I have experienced or I expect to experience an undesirable change in my work situation.
7. My current occupational position adequately reflects my education and training.
8. Considering all my efforts and achievements, I receive the respect and prestige I deserve at work.
9. Considering all my efforts and achievements, my job promotion prospects are adequate.
10. Considering all my efforts and achievements, my salary/income is adequate.

Moderator
Workplace networks

1. While at work, how often do you have *friendly work-related* communication (e.g., talk collaboratively about patient care) with coworkers in the following professions?

	Never	Rarely	Sometimes	Often	Always
Nursing					
Physician					
Allied health therapist (e.g., speech, occupational, physical therapies)					
Mental/Behavioral Health					
Case management					
Housekeeping					
Administrative/Leadership					
Secretarial					

What types of topics are you discussing during friendly, work-related conversations?

2. While at work, how often do you have *friendly* **non-*work-related*** communication (e.g., talk about personal or family situations) with coworkers the following professions?

	Never	Rarely	Sometimes	Often	Always
Nursing					
Physician					
Allied health therapist (e.g., speech, occupational, physical therapies)					
Mental/Behavioral Health					
Case management					
Housekeeping					
Administrative/Leadership					
Secretarial					

What types of topics are you discussing during friendly, non-work-related conversations?

3. While at work, how often do you have ***hostile or difficult work-related*** communication with coworkers in the following professions?

	Never	Rarely	Sometimes	Often	Always
Nursing					
Physician					
Allied health therapist (e.g., speech, occupational, physical therapies)					
Mental/Behavioral Health					
Case management					
Housekeeping					
Administrative/Leadership					
Secretarial					

What types of topics are you discussing during hostile or difficult work-related conversations?

4. While at work, how frequently do you **receive** support, advice, and/or help from coworkers in the following professionals?

	Never	Rarely	Sometimes	Often	Always
Nursing					
Physician					
Allied health therapist (e.g., speech, occupational, physical therapies)					
Mental/Behavioral Health					
Case management					
Housekeeping					
Administrative/Leadership					
Secretarial					

5. While at work, how frequently do you **provide** support, advice, and/or help to coworkers in the following professionals?

	Never	Rarely	Sometimes	Often	Always
Nursing					
Physician					
Allied health therapist (e.g., speech, occupational, physical therapies)					
Mental/Behavioral Health					
Case management					
Housekeeping					
Administrative/Leadership					
Secretarial					

What are other types of life events or issues that keep you from being physically or mentally present at work? For example, birth/adoption, deportation, loss/death of family or friends, relocation, divorce, or remarriage.

Outcomes
Oldenburg Burnout Inventory (Demerouti et al., 2001; Demerouti, Mostert, & Bakker, 2010)
Instruction: Below you will find a series of statements with which you may agree or disagree. Using the scale, please indicate the degree of your agreement by selecting the number that corresponds with each statement.
1 = strongly agree
2 = agree
3 = disagree
4 = strongly disagree

1. I always find new and interesting aspects in my work.
2. There are days when I feel tired before I arrive at work.
3. It happens more and more that I talk about my work in a negative way.
4. After work, I tend to need more time than in the past in order to relax and feel better.
5. I can tolerate the pressure of my work well.
6. Lately, I tend to think less at work and do my job almost mechanically.
7. I find my work to be a positive challenge.
8. During my work, I often feel emotionally drained.
9. Over time, one can become disconnected from this type of work.
10. After working, I have enough energy for my leisure activities.
11. Sometimes, I feel sickened by my work tasks.
12. After my work, I usually feel worn out and weary.
13. This is the only type of work that I can imagine myself doing.
14. Usually, I can manage the amount of my work well.
15. I feel more and more engaged in my work.
16. When I work, I usually feel energized.

Disengagement items are 1, 3(R), 7, 9(R), 11(R), 13, 15. Exhaustion items are 2(R), 4(R), 5, 8(R), 10, 12(R), 14, 16. (R) means reversed when the scores should be such that higher scores indicate more burnout.

Rand 36 Health Survey (Moorer, Suurmeijer, Foets, & Molenaar, 2001).

Physical functioning
The follow are activities you might do in a typical day. Does your health now limit you in these activities? If so, how much?

	No, not limited at all	Yes, limited a little	Yes, limited a lot
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports			
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf			
Lifting or carrying groceries			
Climbing several flights of stairs			
Climbing one flight of stairs			
Bending, kneeling, or stooping			
Walking more than a mile			
Walking several blocks			
Walking one block			
Bathing or dressing yourself			

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

> **Yes; No**
> 1. Cut down on the amount of time you spent on work and other activities
> 2. Accomplished less than you would like
> 3. You were limited in the kind of work or other activities
> 4. Had difficultly performing the work or other activities

General health perceptions

1. In general, would you say your health is:
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor
2. My health is excellent.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false
3. I am as healthy as anybody I know.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false
4. I seem to sick easier than other people.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false
5. I expect my health to get worse.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false

Bodily Pain

1. How do you rate the severity of your pain?
    a. None
    b. Very mild
    c. Mild
    d. Moderate
    e. Severe
    f. Very severe
2. To what extent does pain interfere with your work?
    a. Not at all
    b. A little bit
    c. Moderately
    d. Quite a bit
    e. Extremely

Reported change

1. Compared to one year ago, how would you rate your health in general now?
   a. Much better now
   b. Somewhat better now
   c. About the same
   d. Somewhat worse now
   e. Much worse now