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EMPLOYEE WELLNESS COACHING AS AN INTERPERSONAL
COMMUNICATION INTERVENTION: EXPLORING INTERVENTION EFFECTS
ON HEALTHCARE COSTS, RISKS, AND BEHAVIORS

A Dissertation

Submitted to the Faculty

of

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In Partial Fulfillment of the

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of

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West Lafayette, Indiana

For Mama, Amanda and Ross

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ABSTRACT

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In order to address the rise in healthcare expenditures, employers are turning to wellness programs as a means to potentially curtail costs. One newly implemented program is wellness coaching, which takes a communicative and holistic approach to helping others make improvements to their health. Wellness coaching is a behavioral health intervention whereby coaches work with clients to help them attain wellness-promoting goals in order to change lifestyle-related behaviors across a range of areas. Given the limited amount of research on wellness coaching, this project had four main purposes in order to fill gaps in the literature: to (1) identify whether wellness coaching interventions have an impact on client healthcare outcomes, (2) apply confirmation theory to this context in order to provide an explanatory framework to better understand the communication mechanisms that underlie this intervention, (3) identify the various topics that are discussed during wellness coaching sessions, and (4) test the extent to which a wellness coaching intervention should be targeted to specific clients. To examine these questions, a large employee wellness coaching program was evaluated, which serviced a population of over 14,000 employer insured individuals from several local employers of which almost 500

specifically attended wellness coaching sessions. Secondary data linking the use of coaching services with health claims information such as healthcare costs, risks and behaviors for all employees and their covered dependents were analyzed. By utilizing a statistical tool called propensity scoring, coached participants were matched with non-coached participants on key characteristics in order to create a meaningful comparison group to test treatment effects. Evidence demonstrates that participation in wellness coaching is associated with higher levels of healthcare costs and utilization, which is mediated by increased indicators of patient engagement. Results suggest that initial healthcare costs associated with improved patient engagement with healthcare providers decreases over time. These results are consistent with other research on wellness interventions that find that initial costs show a return on investment over time. These results also support previous research on confirmation theory, indicating that the scope of this theory may be broader than contexts previously studied. Analysis of participant wellness goals reveal that a range of issues are discussed during coaching sessions including physical health and mental, relational and financial/professional wellbeing. Finally, results suggest that this communicative intervention shows comparably broad impact across a range of client characteristics but may work particularly well for clients with chronic disease management goals, weight management goals, and mental wellbeing goals. Clients with multiple wellness goals also showed stronger results than those with fewer wellness goals. Those with smoking cessation goals were the only group that showed results in the opposite direction. The results of this project have theoretical, practical and methodological implications and suggest several areas for future research.

CHAPTER 1. INTRODUCTION

1.1 Introduction

In 2012 United States healthcare spending reached \$2.8 trillion (Centers for Medicare and Medicaid Services, 2012). Roughly 84% of U.S. healthcare dollars and approximately 99% of Medicare spending are attributable to individuals with chronic diseases (Anderson, 2010). In a 2012 study, the Centers for Disease Control and Prevention (CDC) stated that many chronic conditions are preventable, and are often exacerbated by unhealthy behaviors (Laing et al., 2012). Both employers and employees pay the consequences for this strain on the healthcare system, with health insurance premiums for a typical family of four increasing by 101% in the past 11 years (Kaiser Family Foundation, 2010). These conditions not only affect healthcare costs, but absenteeism, presenteeism, and productivity in the workplace (Goetzel et al., 2004; Haynes & Dunnagan, 2002), resulting in employers spending an additional \$225 billion per year on these indirect effects (CDC, 2013).

Traditional healthcare visits related to managing patient chronic conditions do not appear to be helping (Brown, Stewart, & Ryan, 2003; Frates, Moore, Lopez, & McMahon, 2011; Huffman, 2007). Healthcare providers, physicians in particular, are well trained at diagnosing and treating specific illnesses, but they have less practice working closely

with patients to manage complex behavioral changes over time. Additional barriers (e.g., limited time) make it difficult for healthcare providers to address situations where other aspects of a patient's life, such as personal relationships, economic pressures, and/or psychological issues, may impact health behaviors and decision-making (Frates et al., 2011; Huffman, 2007). As such, about half of patients leave primary care visits not understanding what their doctor told them (Bodenheimer, 2007). Similarly, average adherence rates for lifestyle changes (e.g., increased exercise and healthy eating, smoking cessation) are below 10% (Haynes, McDonald, & Garg, 2002). Moreover, traditional medicine has typically been reactive rather than proactive in addressing health issues such that patients get treated *after* they get sick (Prilleltensky, 2005). Given these concerns, researchers have called for increased attention to preventive and wellness services, especially those designed to better support chronic conditions that need prolonged management and active patient participation and adherence (Carnethon et al., 2009; Parks & Steelman, 2008).

Organizations that bear the burden of rising healthcare costs, such as large employers, have responded to this problem with the implementation of a wide range of health and wellness services intended to prevent the onset of disease and/or to diagnose and treat disease at an early stage (Geist-Martin, Horsley, & Farrell, 2003; Farrell & Geist-Martin, 2005; Mattke et al., 2013). Work-site wellness programs include screening activities (e.g., measurement of body weight), health promotion activities (e.g., healthy food options in the cafeteria), health campaigns targeted to employee wellness and preventive issues, health-related workshops and a variety of other activities. Of particular interest to scholars looking at interpersonal communication processes, health coaching

programs provide a particularly salient context for examining the impact of highly tailored communication activities oriented toward improving employee health and wellness.

This introductory chapter provides an overview of traditional health and wellness coaching programs and their impact on healthcare outcomes. It summarizes the main goals of the research project in an effort to address some of the limitations in the wellness coaching literature. In doing so, an overview of confirmation theory and its application to wellness coaching interventions is discussed. Areas that may allow for the tailoring of this communication intervention are also presented. Finally, a preview of the research methodology undertaken to address these goals is provided, along with a description of each chapter.

1.2 Brief Overview of Traditional Health and Wellness Coaching

Health coaching programs take a variety of forms, but they typically involve the use of dyadic or small group interactions between trained professionals and employees, or their covered dependents, in a wide range of educational or other health support activities designed to develop participant capacity and motivation to address actual or potential health issues. Traditional health coaching, often heavily tied to formal healthcare delivery organizations, focuses mostly on ways to improve the management of specific medical conditions such as heart disease, diabetes, and cancer. Conversely, integrative health coaching or wellness/lifestyle coaching takes a more holistic approach. It is a behavioral intervention conducted by credentialed health, fitness, and mental health professionals who help clients attain wellness-promoting goals in order to change

lifestyle-related behaviors across a range of areas, including physical activity, nutrition, weight, stress, and life satisfaction (Moore & Tschannen-Moran, 2010).

Several studies have concluded that traditional health coaching leads to improved behavioral and health outcomes including increased exercise and healthy eating, increased weight loss, improved disease self-management, and lowered total cholesterol (see Edelman et al., 2006; Holland et al., 2005; Tidwell et al., 2004; Vale et al., 2002; Vale et al., 2003; Whittemore, Melkus, Sullivan, & Grey, 2004). However, there is little empirical support for the successfulness of wellness coaching programs on healthcare outcomes. In this project, healthcare outcomes is a collective term used to represent the way medical claims data typically operationalizes this concept, that is, by focusing on healthcare costs, risks and behaviors as opposed to clinical definitions, which focus on health status. Operationalizing healthcare outcomes in this way is advantageous to companies who are increasingly promoting this holistic approach to improve health and wellness because it can establish whether the adoption of this intervention will improve employee engagement with the healthcare system which should eventually lead to an improvement in their overall health while potentially saving employers money over time. Thus, the first goal of this research project is to examine the extent to which wellness coaching and variations within this intervention (e.g., frequency and distribution of coaching sessions) are able to impact healthcare outcomes.

Second, while wellness coaching has relied on several theories to inform this intervention, they have served as more of a philosophical framework, positing core principles that guide the development of wellness coaching components. This intervention lacks a unifying *predictive* theory that succinctly explains its underlying

communicative mechanisms and their effects on health outcomes. A theory is needed that best captures the nuances that exist in a wellness coaching intervention compared to traditional health coaching interventions. More specifically, in traditional health coaching, the focus is usually directed at building client knowledge and behavioral skills in a very targeted area of concern. In contrast, wellness coaches develop a collaborative relationship with clients, support clients regarding a broad range of issues, and rely on communicative tools to solicit and motivate behavior change in client-defined areas of concern (Moore & Tschannen-Moran, 2010). This inherent ambiguity, which by definition provides a set of shifting health issues to address, creates a more complicated context to which coaches must adapt when working with clients and potentially necessitates a higher level of interpersonal communication skill on the part of the coach.

To support this type of coaching interaction, wellness coaches are often trained specifically in the use of counseling strategies, such as appreciative inquiry and motivational interviewing techniques (Moore & Tschannen-Moran, 2010), that are designed to create positive and supportive social interactions in which to explore the unique challenges of the client. In communication research, confirmation theory, building off of the social support literature, posits that health-related outcomes from interpersonal relationships realize their impact, fundamentally, through the development of individual self-worth and personal growth facilitated by two broad categories of messages: acceptance and challenge (see Dailey, Richards, Romo, 2010). Confirming messages are inherently supportive in that they communicate to others that they are valued and worthy of respect while also including sentiments that challenge the other to reach their full potential. This view of supportive communication in the context of health is consistent

with the philosophical rationale behind wellness coaching programs and the techniques wellness coaches are trained to provide in their consultations. Thus, I seek to reframe the process of wellness coaching by applying a confirmation theory lens in order to help explain why this communicative intervention may impact healthcare outcomes.

By undertaking this re-conceptualization of wellness coaching, it bares light on the need to further understand what is actually being discussed during coaching sessions. To date, it is unclear what the actual types of issues are that participants seek to manage during this intervention. Wellness coaching is described as addressing a variety of health and wellness issues (e.g., weight, life satisfaction), yet it is unknown what these specific goals entail, and in turn, what coaches are talking about in their sessions. As such, a third purpose is to provide a richer description of the types of goals addressed during wellness coaching.

The final goal of this project is to test whether wellness coaching should be targeted to clients with varied characteristics. This provides an opportunity to expand the application of confirmation theory while also suggesting practical results that will be useful for those intending to implement a wellness coaching intervention. After all, the goal of wellness coaching is to create a highly tailored intervention directed toward addressing the idiosyncratic needs of a diverse client population, thus, identifying important moderators of the success of this type of intervention to facilitate improved tailoring strategies is key (Rimer & Kreuter, 2006). In this context, four potential moderators seem particularly salient: type of client wellness goals, wellness complexity, client sex, and health risk status. Researchers have shown that the reception of confirming messages from close others can help people attain their weight management

goals (e.g., Dailey, Richards, et al., 2010). What is less known is whether an intervention relying on similar communicative strategies can help others attain other types of goals (e.g., stress management, smoking cessation). In this way, this project seeks to analyze whether clients with varying wellness issues and wellness complexity (e.g., the range of wellness goals they wish to attain) will experience different outcomes following a wellness coaching intervention, and will in turn, identify other wellness contexts for which confirmation theory can be applied. In addition, research frequently shows differences between men and women in terms of prevalence of various diseases and health risk behaviors (e.g., CDC, 2011b; Lochner & Cox, 2010; Naimi et al., 2003; National Center for Health Statistics, 2014; Nolen-Hoeksema, 2004; Ogden, Carroll, Kit, & Flegal, 2012). Thus, sex may impact the type of healthcare outcomes participants experience following a coaching intervention. One's health risk status may also influence these outcomes. Most studies focusing on health risk status treat it as an outcome variable (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009; Engbers, van Poppel, Chin A Paw, & van Mechelen, 2005; Milani & Lavie, 2009; Mills, Kessler, Cooper, & Sullivan, 2007), yet it is useful to test whether those with varying health risk levels at the start of an intervention respond differentially to wellness coaching.

In the current project, these key questions are examined by evaluating a large employee wellness coaching program serving a population of over 14,000 employer insured individuals from several local employers of which almost 500 have specifically received wellness coaching services. The project will draw on two secondary data sources linking the use of coaching services with health claims information and health risk assessments for all employees and their covered dependents.

In what follows, a review of the literature, data collection procedures, results, and discussion are presented. More specifically, Chapter 2 serves as a review on health and wellness coaching and relevant social-support literature including confirmation theory's application to wellness coaching. Hypotheses and research questions are also proposed. In Chapter 3, methodologies designed to address the proposed hypotheses and research questions are discussed, while Chapter 4 presents the findings. Finally, Chapter 5 synthesizes the results by providing a clearer picture of the variations and effects of wellness coaching interventions on healthcare outcomes, and integrates the findings with current research. Theoretical, practical and methodological implications are discussed along with limitations and directions for future research.

CHAPTER 2. LITERATURE REVIEW

This project examines the effects of wellness coaching on healthcare outcomes. In order to do so, this chapter first begins with a review on the traditional health and wellness coaching literature. The limitations of these current studies are discussed and the first set of hypotheses and research questions are proposed. Wellness coaching is then framed using the tenets of confirmation theory followed by a discussion of the ways in which confirmation theory's application can be expanded by examining it within a wellness coaching context. The possibilities for targeting wellness coaching are presented along with additional research questions. Finally, a review of the contributions to the current literature concludes the chapter.

2.1 Health Coaching Interventions

Coaching, in general, is a technique that has been used to help promote behavior change in a variety of contexts including sports, exercise, within organizations, and most recently in health and wellness contexts. There are important distinctions between various types of coaching. Most notably, fitness coaches focus their efforts on improving clients' exercise and fitness abilities. They often have credentials in cardiac rehabilitation, personal training, exercise physiology and the like. Traditional health coaching typically includes an educational component with coaching plans tailored to a specific disease based on the client's current medical treatment. Wellness coaching, sometimes referred to

as integrated health or lifestyle coaching (Caldwell, Gray & Wolever, 2013), is broader in scope in that it focuses on a range of life issues that influence health such as physical activity, nutrition, weight, stress, and life satisfaction (Moore & Tschannen-Moran, 2010). The justification of this broad approach is based on the assumption that specific health issues are embedded within a larger system of related psychosocial, situational, and health issues and cannot be addressed effectively as a distinct problem that does not take other factors into account.

2.1.1 Traditional health coaching interventions

Studies have only recently been conducted to test the effectiveness of coaching programs. Most of these studies have focused on traditional health coaching, as opposed to wellness coaching interventions. In traditional health coaching interventions, coaches, usually nurses, meet with patients in a group or individual setting for approximately 30-60 minutes on a weekly or monthly basis (Anderson et al., 2005; Bond, Burr, Wolf, & Feldt, 2010; Hawkins, 2010; Holland et al., 2005; Tidwell et al., 2004; Whittemore et al., 2004). Coaches provide training on ways to care for one's disease based on provider recommendations, while identifying barriers and strategies to implement behavioral changes. They work with patients to set goals, construct personalized health plans, track their food and exercise activities, and monitor their biomedical outcomes. Coaches also strive to increase patient self-efficacy through general encouragement, guidance with problem solving, and feedback (Anderson et al., 2005; Bond et al., 2010; DeBar et al., 2006; Edelman et al., 2006; Hawkins, 2010; Holland et al., 2005; Tidwell et al., 2004; Vale et al., 2002; Vale et al., 2003; Whittemore, Chase, Mandle, & Roy, & 2001; Whittemore et al., 2004).

The results of these interventions lend support for the positive impact health coaching has on its participants across a variety of diseases. For example, health coaching shows a positive impact on psychosocial (e.g., disease knowledge, self-efficacy; Bond et al., 2010; Hawkins, 2010), behavioral (e.g., diet self-management; Whittemore et al., 2004) and health (e.g., lowered HbA1c levels; Hawkins, 2010) outcomes in patients with diabetes. Patients with coronary heart disease increased their amount of exercise per week, increased their amount of weight loss (Edelman et al., 2006), and lowered their total cholesterol levels (Vale et al., 2002; Vale et al., 2003) following a health coaching intervention. Similarly, adolescent girls with body mass indexes below the national median had long-term increased bone mineral density, calcium and vitamin D intake, and fruit and vegetable consumption after participating in a health coaching program (DeBar et al., 2006). Finally, health coaching interventions conducted with elderly populations with at least one chronic health condition also showed success with increased adherence to exercise and health condition management programs (Holland et al., 2005; Tidwell et al., 2004). Taken together, these studies provide evidence for the efficacy of health coaching interventions across a range of beneficial psychosocial, behavioral and health outcomes.

2.1.2 Traditional health versus wellness coaching

Given that wellness coaching is a type of health coaching, it is common for both interventions to use similar methods to elicit behavior change. For example, traditional health and wellness coaches typically have clients set long- and short-term health goals (Edelman et al., 2006; Holland et al., 2005; Tidwell et al., 2004; Vale et al., 2002; Vale et al., 2003), they assess barriers to behavior change (Vale et al., 2002; Vale et al., 2003),

focus on increasing patient self-efficacy (Anderson et al., 2005; Bond et al., 2010; Edelman et al., 2006; Hawkins, 2010; Whittmore et al., 2004; Wolever et al., 2010), and use affective strategies to cope with one's health condition (e.g., motivational interviewing; Edelman et al., 2006; Whittmore et al., 2004). Yet there are distinct differences between traditional health and wellness coaching, making it possible that these interventions would lead to different outcomes. For example, wellness coaches do not overtly provide an educational component, which is a major emphasis of traditional health coaching sessions. Rather, clients are responsible for generating their own health management solutions with coaches occasionally offering advice in their area of expertise when solicited. In addition, although wellness coaches may work with clients who have chronic health conditions, they do not typically work as closely with a client's medical providers, nor is it *required* for coaches to discuss a particular chronic health issue with a patient even if a chronic condition exists. Instead, wellness coaching takes a more holistic approach to health and wellness, acknowledging that a wide array of life issues may be impacting one's health (Galantino et al., 2009; Moore & Tschannen-Moran, 2010). Table 2-1 provides a summary of the similarities and differences between traditional health versus wellness coaching.

2.1.3 Wellness coaching interventions

Only a handful of studies have tested the effectiveness of coaching interventions that utilize wellness versus traditional health coaching strategies (Ammentorp, Uhrenfeldt, et al., 2013). For example, Galantino et al. (2009) conducted an intervention to evaluate the immediate and longitudinal impact of wellness coaching sessions for cancer survivors in improving health, fitness, well-being and overall quality of life. The intervention

Table 2-1 Traditional Health versus Wellness Coaching

	Differences	Similarities
Traditional health coaching	<ul style="list-style-type: none"> • Typically focuses on a specific chronic illness • Often work in conjunction with client's medical provider • Relies on educational component • Coaches are typically nurses 	<ul style="list-style-type: none"> • Purpose to promote behavior change, which should elicit improved client outcomes • Clients set long- and short-term goals • Assess barriers to behavior change • Focus on increasing client self-efficacy
Wellness coaching	<ul style="list-style-type: none"> • Holistic approach – focuses on an array of life issues impacting one's health • Clients generate own health management solutions • Coaches offer advice only when solicited • Coaches are typically health, fitness, or mental health professionals 	<ul style="list-style-type: none"> • Use affective strategies to cope with conditions (e.g., motivational interviewing)

consisted of 6 telephone sessions, with the initial session lasting 90 minutes and 5 follow up sessions completed over three months lasting 30-40 minutes each. Coaches empowered participants to be their own expert as they developed a wellness vision and behavioral plan that fit within their life framework. Follow up sessions included reflection of their plan and coaching around any areas of concern. Results revealed an increase in quality of life ($\eta^2 = .14$), decreased depression ($\eta^2 = .06$) and anxiety ($\eta^2 = .03$), and an increase in physical activity ($\eta^2 = .06$; Galantino, et al., 2009).

A randomized control trial with patients who had spinocerebellar degeneration examined the effect of a coaching intervention on psychological adjustment to illness and health-related quality of life (Izumi et al., 2007). The intervention consisted of 10

telephone coaching sessions (15-30 minutes each) over 3 months. Coaches helped participants set goals, evaluate their wellness status, acknowledge the gap between their goal and status, and develop action plans to overcome this gap. Although most results for self-report health status and psychological adjustment outcomes were non-significant (likely due to the small sample size), the intervention did lead to improvements in self-efficacy scores ($\eta^2 = .27$).

Wolever et al., (2010) conducted a randomized control trial that tested whether an integrative health coaching intervention would impact psychosocial factors, behavior change and glycemic control in patients with type 2 diabetes. Participants attended 14 telephone coaching sessions (30 minutes each), on a weekly, biweekly and monthly basis. Coaches helped participants identify their own values and vision of health and to set goals that were in line with this vision. Participants experienced lowered HbA1c levels ($\eta^2 = .02$), reduced barriers to medication adherence ($\eta^2 = .04$), and increased frequency of exercise ($\eta^2 = .09$) and perceived health status ($\eta^2 = .01$). Other wellness coaching interventions found similar results including decreased HbA1c levels (Ammentorp, Thomsen, & Kofoed, 2013) and an increase in goal attainment (Schneider et al., 2011) for participants with diabetes.

2.1.3.1 Limitations of wellness coaching studies

The results of these wellness coaching studies are promising, although they are not without their limitations. First, some studies have very small sample sizes, with most ranging between 9-56 participants (Ammentorp, Thomsen, et al., 2013; Galantino et al., 2009; Izumi et al., 2007; Wolever et al., 2010). This may limit the power of a study, thus

increasing the chances of committing a Type II error. In addition, small samples have more variability that can lead to sampling error, which can also impact effect sizes (see Shadish, Cook & Campbell, 2002). Other studies rely solely on self-report data to assess improvements in health outcomes (Galantino et al., 2009; Izumi et al., 2007; Schneider et al., 2011), which could limit validity such that participants' responses may be influenced by their needs for consistency, self-enhancement, or self-presentation (see Paulhus & Vazire, 2007). Moreover, some studies lack control groups (Ammentorp, Thomsen, et al., 2013; Galantino et al., 2009; Schneider et al., 2011), thus allowing for the possibility of selection bias to introduce threats to validity (see Shadish et al., 2002). As such, additional evidence regarding the impact of wellness coaching programs is needed to account for these limitations.

The wellness coaching literature has not examined the impact of coaching on medical claim costs, risks and behaviors, information that is of key value to employers considering these types of services. However, some research on traditional health coaching suggests that patient-self management programs can lower healthcare costs for those with chronic conditions (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Lorig et al., 2001; Lorig et al., 1999). Other research on wellness programs in general suggest that it may take a few years to see a return on investment for these types of programs (Chapman, 2012; Merrill, Hyatt, Aldana, & Kinnersley, 2011; Naydeck, Pearson, Ozminkowski, Day, & Goetzel, 2008). It is plausible then, that a wellness coaching intervention may increase costs initially but eventually improve costs over time. This may be due in part, to an increase in improved patient utilization of healthcare resources. More specifically, coaching may increase a client's willingness to engage with the

healthcare system by increasing their use of preventive health services (e.g., refilling necessary prescriptions, getting health screenings, getting annual check-ups), which would increase the initial costs of healthcare claims. It is reasoned that the use of preventive services should eventually lead to long-term savings as it prevents the onset or exacerbation of health conditions that require more costly healthcare services (Berwick, Nolan, & Whittington, 2008). In the short term, then, indicators of improved patient engagement may mediate the relationship between coaching and initial healthcare costs and utilization, which may be influenced by the length of time since clients' last coaching session.

Moreover, the current research on traditional health and wellness coaching has yet to address the issue of treatment dosage. In past studies, the amount of coaching sessions has varied substantially from 6 (Galantino et al., 2009) to 14 (Wolever et al., 2010) sessions, with sessions spreading out over a span of 3 (Galantino et al., 2009; Izumi et al., 2007) to 6 months (Wolever et al., 2010). It is possible that the amount (e.g., number of sessions) and distribution/density (e.g., weekly, biweekly, monthly) of coaching sessions may impact the successfulness of coaching interventions. Previous research in similar contexts partially supports this notion; for example, investigations of weight management interventions found that participants lost more weight when they attended more sessions (Ahern, Olson, Aston, & Jebb, 2011; Djuric et al., 2002). The coaching interventions that are reviewed here examine the effects of coached versus non-coached participants as opposed to in-group variation related to the amount of coaching. Not only is it important to determine whether participation in a coaching intervention is helpful, but identifying the most successful amount and distribution of coaching can allow coaches to improve

upon the structure of their sessions to maximize client outcomes. In the context of wellness coaching, this is particularly relevant given that clients are encouraged to develop specific goals and discuss progress toward those goals over time. However, no clear best practices related to amount and density of coaching is apparent.

Though the current research on wellness coaching shows promise, additional support for the efficacy of such programs, as well as the extent of the intervention itself to achieve healthcare outcomes (i.e., healthcare costs, risks, and behaviors), is warranted. In order to address these gaps in the literature, the following hypotheses and research questions are advanced:

H1: Participants in a wellness coaching program will exhibit differences in healthcare outcomes compared to similar others who have not participated in a wellness coaching program.

H2: Variation in patient engagement will mediate the relationship between wellness coaching participation and healthcare outcomes.

RQ1: Is the length of time since participants' last coaching session associated with healthcare outcomes?

RQ2: How is the amount and density of wellness coaching associated with healthcare outcomes for coached participants?

Though there is a growing body of support suggesting the possible efficacy of wellness coaching, studies have not directly discussed the communicative underpinnings presumed to account for their success, even though these assumptions are heavily embedded within the wellness coaching literature.

2.1.4 Wellness coaching and positive psychology

Wellness coaching is derived from the principles of positive psychology, which is “the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups, and institutions” (Gable & Haidt, 2005, p. 104). Positive psychologists recommend a shift in the “fix-what’s-wrong” approach to the “build-what’s-strong” approach (Duckworth, Steen, & Seligman, 2005). This emphasis is predicated on the notion that it is more beneficial to focus on a person’s strengths, ambitions, and positive life experiences as opposed to their vulnerabilities, poor habits, and negative life events (Kauffman, 2006). Hence, counselors and coaches operating from a positive psychology perspective typically employ specific communication strategies to facilitate identification and support of a client’s strengths: appreciative inquiry and motivational interviewing.

2.1.4.1 Appreciative inquiry

Appreciative inquiry (AI) “involves the art and practice of asking questions that strengthen one’s capacity for positive potential” (Cooperrider, Whitney, & Stavros, 2003, p. 3). It assumes that a person is a “solution to be embraced” rather than a “problem to be solved” (Cooperrider et al., 2003, p. 5). AI is predicated upon several core principles (Cooperrider et al., 2003). First, positivity leads to positive outcomes. Coaches can go beyond problem solving by identifying, appreciating, and amplifying strengths. Second, positivity is a function of social constructionism. The use of positive language actually creates a reality that is inherently positive. Third, simply asking a positive question is not a prelude to change but is change itself. The moment a positive question is asked, or a

positive story or reflection is shared, the interaction becomes positive. Fourth, anticipating positivity in the future will help shift the present in that direction. This positive anticipation allows for creativity, resourcefulness and resilience. Finally, focusing on problems generates more problems whereas focusing on possibilities generates more possibilities. As such, coaches ask clients to focus more on what went well in the previous week or how they think they can succeed in the future, as opposed to focusing on the struggles they experienced (Moore & Tschannen-Moran, 2010). Research shows that the inclusion of AI techniques can lead to several benefits such as improved process, satisfaction and task performance outcomes (Bushe & Coetzer, 1995).

2.1.4.2 Motivational interviewing

Wellness coaching programs also rely heavily on motivational inquiry (MI) techniques, which is a non-directive communicative tool that allows the coach and client to work collaboratively in order to enhance a client's motivation to change (Passmore & Whybrow, 2007). Several components constitute the core of MI. First, coaches must express empathy so that clients can feel safe to explore conflicting and difficult feelings associated with change in order to come to a resolution (Markland & Vansteenkiste, 2007; Miller & Rollnick, 1991; Rogers, 1951). Second, coaches encourage clients to explore their ambivalence by focusing on the benefits and disadvantages of changing versus not changing their behavior. Developing this discrepancy between their existing behaviors and their goals and values paves the way for change (Markland & Vansteenkiste, 2007; Resnicow et al., 2004). MI also involves rolling with resistance. Rather than having the coach argue for change, clients are expected to make the case for

change (Miller & Rollnick, 2002; Resnicow, Baskin, Rahotep, Periasamy, & Rollnick, 2004). When individuals make their own arguments for a position, they are more likely to accept and act upon them (Bem, 1972). As such, clients are engaging in ‘change talk’ or ‘self-motivating statements,’ which are “declarations by clients that reflect the positive pole of their ambivalence, demonstrating a recognition that change is needed and that change would be a good thing, an optimism that change is possible, and ultimately an intention to change” (Markland & Vansteenkiste, 2007, pp. 90-91).

Other tools used within MI are agenda setting and reflective listening techniques. To further increase clients’ motivation to change, the client is asked to set the agenda for the session. This includes deciding what they will talk about and setting goals for the session and/or week (Resnicow et al., 2004). With reflective listening, coaches focus on prior successes or they positively reframe previous unsuccessful attempts as practice as opposed to failure; this helps increase the belief that clients possess the skills to enact behavior change (Moore & Tschannen-Moran, 2010). Evidence suggests that the use of MI techniques leads to several positive outcomes. For example, Butterworth, Linden, McClay, and Leo (2006) conducted a study where participants self-selected into a treatment or a control group. Those in the treatment group attended a 3-month health coaching program that consisted of an initial 30-minute session with two follow-up meetings. Health care professionals were trained in MI in order to address clients’ health concerns. Pre-test and post-test measures revealed that those in the treatment condition improved their self-reported physical and mental health status compared to those in the control condition. Other studies found similar results, with MI based interventions leading to improvements in self-efficacy, HbA1c levels, illness knowledge, patient

activation, and lifestyle changes (Hawkins, 2010; Linden, Butterworth, & Prochaska, 2010).

2.1.5 Wellness coaching and social support

Because of its roots in positive psychology, the parallels between AI and MI techniques with commonly studied social support processes are relatively clear. The fundamental goal of wellness coaching is to foster a supportive climate through effective messaging strategies. Supportive communication has been studied in a wide range of contexts (e.g., stress, illness), and has been linked with improved well-being (see Burleson & MacGeorge, 2002). Hence, coaches who are effective at generating supportive messages should facilitate better client outcomes. Goldsmith and Finch (1997) suggest that better attempts at support involve communication messages that are sensitive to dilemmas inherent in social support interactions. These dilemmas may include feelings of low self-esteem and self-efficacy and ambivalence towards achieving one's health and wellness goals (Moore & Tschannen-Moran, 2010). Thus, coaches must strike a balance between providing assistance and affirming valued identities (Brashers, Neidig, & Goldsmith, 2004), which are often at tension with each other.

2.1.5.1 Forms of social support

House (1981) identifies several forms of supportive behaviors, with emotional, informational and appraisal being most relevant to the coaching context. Most notably, emotional support involves providing empathy, care, and trust (House, 1981). Possessing competent listening skills, especially empathic listening, is crucial for delivering emotional support. It involves listening behaviors that promote maximum understanding

of communication from the speaker's perspective (Stiff, Dillard, Somera, Kim, & Sleight, 1988) and requires active listening behaviors, which is demonstrated by the use of backchannels such as "uh huh" and "ummm" (Thomas & Levine, 1994). Other empathic listening behaviors include using silence as a response, providing verbal encouragement, seeking clarification, restating the client's message, asking probing questions, and not interrupting (McComb & Jablin, 1984). These communicative strategies, among others, constitute what is considered person-centered emotional support, which are messages intended to acknowledge, explore and legitimize the feelings and perspectives of others (Burlison, 1994). The reception of emotional support can lead to increased levels of client satisfaction (Branch & Malik, 1993; Burgoon et al., 1987; Wanzer, Booth-Butterfield, & Gruber, 2004), increased feelings of trust with one's interlocutor (Mechanic & Moyer, 2000), and even decreased mortality (Thong, Kaptein, Krediet, Boeschoten, & Dekker, 2007).

Informational support involves providing a person with information or advice in order to cope with their problem (House, 1981). For example, coaches may advise clients to switch from white to whole wheat breads or may suggest gardening as a form of exercise. Evidence suggests that there is a positive association between receiving informational support and healthy eating and exercise habits (McKinley, 2009; McKinley & Wright, 2014; Thornton et al., 2006).

Appraisal support refers to the reception of evaluative feedback (House, 1981). Coaches praise clients when they are successful at achieving their health and wellness goals. They also provide opportunities for clients to reflect on their progress towards achieving their health vision in order to identify if they are following through with their

wellness plans. One study found that of all the categories of social support, appraisal support was the form most highly correlated with weight loss (Marcoux, Trenkner, & Rosenstock, 1990).

2.1.6 Confirmation theory and social support

Confirmation theory builds off of the social support literature and focuses on how the quality of interpersonal communication can foster particular climates that can affect dyadic outcomes (Dailey, McCracken, & Romo, 2011; Dailey, Richards, et al., 2010; Dailey, Romo, & McCracken, 2010; Dailey, Romo, & Thompson, 2011; Dailey, Thompson, & Romo, 2014; Sieburg, 1985; Watzlawick, Beavin, & Jackson, 1967). It suggests that people have a fundamental need to be validated by others to enhance their sense of self (Buber, 1965; Dailey, Richards, et al., 2010; Laing, 1961; Sieburg, 1985; Watzlawick et al., 1967). According to Dailey, Richards, et al. (2010), “confirming messages from others facilitate individuals’ personal development by validating how individuals define themselves and accepting them as valuable and unique” (p. 458; see also Cissna & Sieburg, 1981; Sieburg, 1976, 1985).

Initially, confirmation messages were classified into types (Sieburg, 1985), however recently it has been thought to lie on a continuum ranging from disconfirming to confirming (Dailey, 2006; Dailey, Richard, et al., 2010; Ellis, 2002). Confirming messages are inherently positive in that they communicate to others that they are valued and worthy of respect, whereas disconfirming messages are inherently negative; they pass judgment and discount or reject others, leading to lower feelings of self-worth (Cissna & Sieburg, 1981; Dailey, Richards, et al., 2010; Laing, 1961; Sieburg, 1976; Watzlawick et al., 1967).

Messages high on the confirming continuum do not just entail unconditional acceptance; they also include sentiments that challenge the other to reach their full potential (Buber, 1965; Dailey, Richards, et al., 2010). As such, confirming messages indicate that the other is a worthy and valuable person, but it does not imply total agreement with his or her opinions or behaviors (see also Dailey, McCracken, et al., 2011; Dailey, Richards, et al., 2010; Dailey, Romo, et al., 2010; Dailey, Romo, et al., 2011; Dailey et al., 2014). According to Daily, Richards, et al. (2010), “Confirmation thus allows and encourages active engagement between speakers, and speakers can validate each other even while opposing the other” (pp. 458-459; see also Friedman, 1983; Sieburg, 1976). To this end, confirming messages consist of two components: *acceptance* and *challenge*. Acceptance allows people to enhance their sense of self, while challenge provides an opportunity for growth (Dailey, Richards, et al., 2010; Dailey, Romo, et al., 2010; Dailey, McCracken, et al., 2011; Dailey, Romo, et al., 2011; Dailey et al., 2014).

In the context of wellness coaching, acceptance is conceptualized as the degree to which coaches show positive regard, care, warmth, and attentiveness during interactions regarding a client’s health and wellness management. Challenge is conceptualized as the degree to which coaches engage in discussion about a client’s health and wellness management and encourage them to enact healthy behaviors. Hence, from a confirmation theory perspective, these two components should help facilitate clients’ goal attainment and individual development.

2.1.6.1 Empirical support for confirmation theory

Confirmation theory has been successfully applied to the weight management context. Dailey, Richards, et al. (2010) administered surveys to college students and community members assessing their health attitudes and behaviors (e.g., efficacy, eating habits), and the use of acceptance and challenge messages delivered by a close other who most influences their weight management. Results indicated that messages from close others that were perceived to be high in both acceptance and challenge were associated with higher levels of body self-esteem, eating and exercise self-efficacy, and healthy eating behaviors. Dailey, Romo, et al., (2011) conducted another study using similar methodology, however they focused specifically on romantic couples. They found that partners who used messages high in acceptance and challenge were perceived as being more effective in helping them enact healthy diet and exercise behaviors; these messages were also associated with higher reports of exercise. Similar methods were also used with mother-teen dyads, which revealed that messages high in acceptance and challenge were perceived as more effective and satisfying (Dailey et al., 2014). It should be noted that Dailey, Richards, et al.'s (2010) original study found interactive effects between acceptance and challenge messages, however subsequent research found the results to be additive (Dailey, Romo, et al., 2010; Dailey, Romo, et al., 2011). Confirming messages have also been associated with moderating effects such that acceptance messages may lead to better eating habits and challenge messages may lead to increased exercise under certain circumstances (Dailey, McCracken et al., 2011). Other studies provide additional support for the link between confirming messages and perceptions of effectiveness in promoting health management (Dailey, McCracken, et al., 2011; Dailey, Romo, et al.,

2010). Taken together, these studies show that confirming messages have a moderate to large effect on weight management outcomes, however, it should be noted that these studies are cross-sectional in nature, making it difficult to establish a causal relationship.

2.1.6.2 Wellness coaching and confirmation theory

The core elements of wellness coaching align with confirmation theory concepts. For example, wellness coaching emphasizes the importance of creating a positive environment through the use of AI and emotional support, which reflects the components of acceptance messages. Coaches also deliver informational and appraisal support while utilizing MI techniques to increase clients' motivation to change their behavior, which reflects the characteristics of challenge messages. Although the techniques used in wellness coaching are not initially framed as such, they are clearly designed to deliver confirming messages. By viewing wellness coaching through a confirmation theory lens, this health intervention is given a much-needed explanatory framework that helps investigate the mechanisms that underlie its processes. In addition, it extends the generalizability of confirmation theory by applying it to this unique coach-client dyad.

2.2 Expanding Confirmation Theory's Application

Applying confirmation theory to a wellness coaching context allows for the testing of additional research questions as a means to identify whether the tenets of this theory hold true across varied relational contexts and recipient characteristics. In turn, the generalizability of confirmation theory will be enhanced while potentially pointing to specific population sub-groups for which wellness coaching can be directed towards.

Before this can be done, one problem with wellness coaching studies must be addressed. Little is known about the different types of client issues that are focused on during coaching sessions, thus it is unclear what wellness coaches actually discuss during their sessions. The very definition of this intervention is that it takes a holistic approach to managing health. However, no studies have described the composition of client issues. Rather, the intervention has broadly been described as helping clients achieve exercise, nutrition, weight, stress and life satisfaction goals (Moore & Tschannen-Moran, 2010) but these categories may not be specific enough to truly capture the range of issues that are discussed during coaching sessions. Thus, another purpose of this project is to identify the specific types of issues that clients seek to address during their consultations. This information will then allow for the possibility of additional targeting of the intervention.

2.2.1 Targeting of wellness coaching

Not all clients may respond to wellness coaching interventions and by extension, confirming messages, in the same way. Rather, individual differences may impact how successful these interventions are. Knowing how different clients will respond to wellness coaching may allow for messages to be targeted to specific sub-groups of the population (Hawkins, Kreuter, Resnicow, Fishbein, & Dijkstra, 2008; Noar, Harrington, & Aldrich, 2009). Targeting has been shown to be an effective strategy for improving intervention outcomes, like healthier diets (Beaudoin, Fernandez, Wall, & Farley, 2007; Boles, Adams, Gredler, & Manhas, 2014) and increased exercise (Fjeldsoe, Miller, & Marshall, 2010; Napolitano & Marcus, 2002) following a weight management intervention. In addition, Dailey, McCracken, et al. (2011) found that recipient features

such as body self-esteem, certain stages of readiness to change, communication satisfaction, internal locus of control, and appearance and strength motives interacted with confirming messages to predict perceptions of effectiveness. This lends further support to the notion that communicative messages that are intended to elicit behavior change may be more advantageous for particular recipients. Four key client features that may allow for the targeting of a wellness coaching intervention are types of client goals, wellness complexity, sex, and health risk status.

2.2.1.1 Client goals

As previously mentioned, research shows that those who have the goal of improving their exercise and eating habits benefit in their weight management attempts following the reception of confirming messages from close others (e.g., Dailey, Richards, et al., 2010). It stands to reason, then, that wellness coaching participants who have similar exercise, nutrition and weight goals should also see improvements in healthcare outcomes because they too are receiving confirming messages from their coaches during sessions. Dailey and colleagues have relied on self-report measures to demonstrate the health improvements that follow from confirming messages (e.g., Dailey, Richards, et al., 2010; Dailey, Romo, et al., 2011), yet it is unknown whether these improvements will be reflected in medical claims data.

Another question that remains is whether confirming messages will lead to health improvements in clients who have other types of wellness-related goals. After all, wellness coaching is a holistic health intervention and is grounded in the notion that one's health is influenced by a variety of life factors beyond one's eating and exercise habits

(e.g., sleep habits, stress). The type of health and wellness issue that clients are trying to manage may influence how successful the intervention is. In other words, this communicative intervention may be more effective given the type of goal the recipient is trying to attain. It is possible that clients who are, for example, seeking to lose weight may experience different outcomes compared to those who are trying to quit smoking. Research on social support interventions provides evidence for this contention, demonstrating that interventions have differing effects based on the type of chronic illness (e.g., diabetes versus arthritis: Gallant, 2003; Sherbourne, Hays, Ordway, DiMatteo, & Kravtitz, 1992).

2.2.1.2 Wellness complexity

It is not unlikely that clients have multiple wellness goals they wish to attain during their interaction with coaches. Of course, clients with several health and wellness issues (e.g., manage diabetes, weight, and depression) may not experience as much success compared to individuals with one major focus (e.g., stress management). Research on comorbidities, or the presence of two or more concurrent chronic conditions, suggests that possessing multiple health conditions is “associated with worse health outcomes, more complex clinical management, and increased health care costs” (Valderas, Starfield, Sibbald, Salisbury, & Roland, 2009, p. 357; see also Parekh & Barton, 2010). Although this pertains specifically to individuals with chronic conditions, it is plausible that individuals with multiple life satisfaction issues they would like to improve (e.g., getting more sleep, improving family relationships) would also have difficulty managing all of their “conditions” and would thus, not benefit as much from

coaching as others with less issues would because of their increase in complexity.

Individuals who have multiple distinct wellness issues they are attempting to manage can be conceptualized as being higher in wellness complexity. It is useful to formally test whether more complex clients experience differential healthcare outcomes following a wellness coaching intervention.

2.2.1.3 Sex

Previous research has shown that variation exists between types of health conditions and behaviors among men and women. For example, women are more likely to experience depression and anxiety (CDC, 2011b) and older women are more likely to have multiple chronic illnesses (Lochner & Cox, 2010). Conversely, men's rates of obesity have been increasing while women's have stabilized (Ogden et al., 2012). Men may also be more likely to engage in unhealthy behaviors like smoking cigarettes (National Center for Health Statistics, 2013) and drinking excessive amounts of alcohol (Naimi et al., 2003; Nolen-Hoeksema, 2004). Participant sex and gender may also influence responses to different types of wellness promoting messages and programs. Research indicates that men and women may perceive confirming messages differently (Cissna & Keating, 1979). Dailey, Romo et al.'s (2010) work extends this finding by demonstrating that women, compared to men, perceive the most effective weight management messages to contain higher levels of acceptance. Regarding more formalized wellness interventions, women may have higher rates of participation in (Aldana, Merrill, Price, Hardy, & Hager, 2005; Spittaels & De Bourdeaudhuij, 2007) and may receive more benefits from (Gritz et al., 1998; Michalsen et al., 2005; Mills et al.,

2007) these types of programs. As such, a wellness coaching intervention may have differential outcomes depending on the sex of the client.

2.2.1.4 Health risk status

Research on participant health risk status frequently treats this variable as an outcome rather than a factor in intervention studies. Results often indicate that wellness programs are successful at improving participants' risk (e.g., Conn et al., 2009; Mills et al., 2007), yet it is fair to presume that effects of interventions will vary based on one's initial level of health risk. Prochaska and colleagues found that results of a smoking cessation intervention were most favorable for the smoking only group, compared to those who were in the smoking plus one risk factor and smoking plus two risk factors groups (Prochaska, Velicer, Prochaska, Delucchi, & Hall, 2006). This study suggests that participants with higher health risks, operationalized as the presence of multiple health risk factors, may fair worse following a wellness intervention. However, more work is needed to test whether healthcare outcomes vary based on one's health risk status, especially within a wellness coaching context that typically addresses numerous health behaviors simultaneously.

In sum, by applying a confirmation theory framework to wellness coaching and exploring the different types of goals clients seek to address during this intervention, more information can be gained about whether confirmation theory by way of a wellness coaching intervention, should be targeted to better meet the needs of its recipients. Given this line of reasoning, the following research questions are proposed:

RQ3: What are the types of wellness goals participants seek to address during a wellness coaching intervention?

RQ4: Are wellness goals related to healthcare outcomes?

RQ5: Is wellness complexity associated with healthcare outcomes?

RQ6: Will the interaction between participation in wellness coaching and sex impact healthcare outcomes?

RQ7: Will the interaction between participation in wellness coaching and health risk status impact healthcare outcomes?

2.3 Contributions of Current Research

The current project makes several contributions to the interpersonal and health communication literature. First, it narrows the gap in the literature by investigating the extent to which wellness coaching is associated with health outcomes. More specifically, it relies on objective measures of health outcomes – medical claims data – to assess the effectiveness of this intervention’s ability to impact healthcare costs, risks and behaviors. In doing so, it utilizes a relatively new statistical technique, propensity scoring, to create a meaningful comparison group of non-coached participants that are matched with their coached counterparts on key factors such as age, sex, healthcare costs, health risk factors, and the like. This technique has become increasingly popular in the health intervention literature but has been largely underutilized in communication research. Thus, this project will help introduce this statistical tool to the interpersonal and health communication discipline. Second, it re-conceptualizes wellness coaching using confirmation theory, thus applying a much-needed theoretical framework to help explain the communication mechanisms underlying this health intervention. Third, to further explore the

communication that occurs during wellness coaching, this project will shed light on the types of wellness goals clients seek to attain during their coaching sessions; an endeavor that has yet to be undertaken. Finally, this project expands the application and improves upon the generalizability of confirmation theory by investigating conditions under which wellness coaching, which utilizes confirming messages during the intervention, will lead to differential outcomes based on client characteristics. This provides practical implications for the ways in which wellness coaching can be targeted to specific sub-groups in the population.

In sum, this chapter reviewed the literature on wellness coaching and social support, while posing hypotheses and research questions to contribute to the interpersonal and health communication literature. The next chapter provides a detailed overview of the methodologies used to address the main goals of this project.

CHAPTER 3. METHODOLOGY

This chapter outlines the methodology for the project. Details of the wellness coaching intervention and secondary datasets are discussed. A brief review of the propensity scoring literature and methods for obtaining a comparison group are then presented. Finally, the independent and dependent variables used in the project are described.

3.1 Wellness Coaching Intervention

3.1.1 Partner Organization

An employer health management firm that works with a variety of large organizations in a local community in the Midwest collected data on employee health claims, risk assessments, and coaching information. Employers included six different organizations made up of manufacturing companies, school corporations, government employees, and hospitals. Employees and their family members were able to attend wellness coaching sessions provided by the firm, which was covered by their insurance as a plan benefit.

In order to become more familiar with the wellness coaching services and secondary datasets, several steps were taken. First, numerous meetings with the health management firm were attended to gain a better understanding of the medical claims data

that were collected. Second, monthly coach training meetings were attended. This provided an opportunity to observe practice coaching sessions and learn more about the coaching certification process. Finally, one-hour one-on-one interviews were conducted with three female wellness coaches in order to gain a better understanding of their experience as a coach including the types of clients they work with and the strategies they use to help clients make behavioral changes. These interviews along with the informal conversations held with the health management firm staff provided a deeper understanding of the coaching intervention and the data elements within the secondary datasets.

3.1.2 Coach certification

Coaches employed by the health management firm were certified in a nationally recognized wellness coaching program. In order to be accepted into the training program, coaches must have one of the following prerequisites: (a) a Bachelor's degree in a health and wellness related area (e.g., counseling, exercise science, nursing); (b) a license in a health and wellness related area (e.g., certified medical assistant, certified pharmacy technician, registered dietitian); (c) a Bachelor's degree in any field *and* a certification in a nationally accredited exercise, fitness or sport training program (e.g., American College of Sports Medicine, National Council for Certified Personal Trainers, National Council on Strength and Fitness); or (d) a certification in a nationally accredited exercise, fitness or sport training program *and* a minimum of 2,000 hours of work experience in the field.

The wellness coaching training program includes eighteen 90-minute classes that take place once a week, with required assignments that must be completed. Lesson topics include, but are not limited to: growth-promoting relationships, expressing compassion,

eliciting motivation to overcome ambivalence, and building self-efficacy. Upon completion of the training program, coaches are eligible to apply for the certification, which includes a practical skills assessment, written exam, and submission of practice client data.

In total, there were nine ($N = 7$ females) different coaches that worked with clients throughout the intervention. Beyond the wellness coaching certification, coaches possessed a range of degrees and certifications in areas including: nutrition, fitness, mental health, social work, nursing, personal and athletic training, and diabetes management.

3.1.3 Coaching sessions

Clients met with a certified coach for an initial 60-90-minute session where they developed a wellness vision that addressed their long-term goals. Clients also identified at least one area of their life where they would like to make changes. Clients then self-generated 3 to 5 weekly goals that would help them move toward achieving their 3-month goals. In each subsequent session, lasting approximately 30-60 minutes, weekly or as needed, coaches and clients reviewed goal attainment progress, identified challenges, brainstormed solutions, and agreed on goals for the following week (Moore & Tschannen-Moran, 2010).

3.2 Secondary Datasets

3.2.1 Procedures

De-identified secondary data was provided by Regenstrief Center for Healthcare Engineering (RCHE) in collaboration with the health management firm. The larger secondary dataset includes 45 months of abstracted health records, based on medical

claims information, on over 14,000 employees, almost 500 of which took part in a wellness coaching intervention at different times during this period (see Table 3-1 for demographic information). The dataset was managed through a health informatics system called MEDai, which uses proprietary algorithms based on a system of factors that influence or predict future behavior to produce detailed health information related to employee healthcare costs, projected healthcare costs, and patient health risk status. This system is an industry leader in predictive modeling and care management analytics solutions. In a study conducted by the Society of Actuaries, MEDai outperformed seven other risk assessment methodologies (Winkelman & Mehmud, 2007). Thus, employers frequently utilize this data management system.

Table 3-1 Demographic Characteristics of Original Secondary Dataset

	Age Mean (SD)	Male	Female	Total
Coached	45.88 (11.99)	148	335	483
Not Coached	38.26 (14.98)	6768	6971	13739
Total	38.52 (14.95)	6916	7306	14222

A second dataset was created for those that received wellness coaching, which was obtained from information maintained within a client management database. Information such as the number and dates of attended coaching sessions as well as records of wellness goals were included. Relevant medical claims data from the first dataset were merged with the coaching only dataset. Of the 483 coached participants, wellness goals from 178 participants could not be matched to the medical claims data because their MEDai identification number was not recorded in the coaching database.

This resulted in a total sample of 361 coached participants for analyses involving wellness goals.

3.2.2 Creating a comparison group

Employers offered a wellness coaching program, which was covered by insurance, to employees and their families. As such, participants self-selected into the treatment group, thus they were not randomly assigned to the intervention condition, which is a limitation of the design. Therefore a statistical technique called propensity scoring was used to allow for comparisons to be made between coached and the entire population of non-coached employees, which helps correct for self-selection bias (Dehejia & Wahba, 2002; Rosenbaum & Rubin, 1983). Although increasing in popularity in intervention research, it has been largely underutilized in communication research (Do & Kincaid, 2006); only a few media effects studies were found that relied on this tool (Ramirez et al., 2013; Smith, Downs, & Witte, 2007; Valenzuela, Arriagada, & Scherman, 2014). This technique creates, within a set of pre-specified parameters, a randomly matched control group based on a selection of observable pre-treatment or baseline characteristics from both the treated and untreated samples. In other words, participants in the treated group are matched with similar others from the untreated group on one or more variables to create an equivalent comparison group in an effort to account for systematic differences that exist between the two groups. This technique thus allows for a better estimation of treatment effects for quasi-experimental designs (i.e., studies lacking random assignment to condition; Austin, 2011b).

The propensity score, ranging from 0 to 1, represents the probability that participants would end up in the treated group, which is dependent on the selected

covariates (Dehejia & Wahba, 2002; Linden, Adams, & Roberts, 2005). Linden et al. (2005) explain that, “propensity scores are derived from a logistic regression equation, which reduces each participant’s set of covariates into a single score, making it feasible to match on what are essentially multiple variables simultaneously” (p. 109; see also Cox, 1970; Cox 1972; Shadish et al., 2002).

There are multiple methods for matching propensity scores from the treated to the untreated sample (for a review see Austin, 2011b). The method used in the current project is many-to-one nearest neighbor within a specific caliper with replacement. The nearest neighbor method with a caliper selects the untreated propensity score that is closest to the treated propensity score within a pre-specified threshold. In other words, “for a given treated subject, one would identify all the untreated subjects whose propensity score lay within a specified distance of that of the treated subject. From this restricted set of untreated subjects, the untreated subject whose propensity score was closest to that of the treated subject would be selected for matching to this treated subject” (Austin, 2011b, p. 406). If multiple untreated participants have the same score, one is selected at random. Conversely, if the treated score cannot be matched with an untreated score within the specified threshold, the treated participant is excluded from the matched sample. While there is no agreed upon preferred caliper width, Austin (2011a, 2011b) suggests using a caliper width equal to .20 of the standard deviation of the logit of the propensity score in order to minimize the mean squared error of the estimated treatment effect.

The nearest neighbor method also allows for the use of the many-to-one matching option. A common approach to propensity scoring is to match one treated participant with one untreated participant. In the many-to-one approach, treated participants are matched

with multiple untreated participants. This method is recommended when there is a substantial amount of untreated compared to treated participants because it improves the generalizability of the results by increasing the sample size and improving statistical power (see Austin, 2008b). Given that approximately 3% of the overall current sample went through the wellness coaching intervention, a 4-to-1 matched ratio was used.

Moreover, matching with replacement was used, which allows for the same untreated participant to be matched multiple times if it is the closest match to multiple treated participants. This option is recommended because it can reduce the potential for bias by minimizing the propensity score distance between treatment and control units. In matching without replacement, there is a risk of matching a treated participant to someone who is less similar on the propensity score, which is more likely in samples when the treatment and comparison units are very different. Thus, groups created using the matched without replacement method may be less similar compared to those that were created using the matched with replacement method (Dehejia & Wahba, 2002). Therefore, a 4-to-1 ratio nearest neighbor matching method within a .20 caliper with replacement was used.

Before estimating the propensity model, 124 coached participants were removed from the dataset because they began the coaching intervention before their first medical claims data were recorded. In other words, they lacked true baseline data. In addition, 36 coached and non-coached participants were removed because they only contained 1 month of medical claims data, hence, they did not have pre- *and* post-treatment data. This resulted in a total of 13,739 untreated participants and 323 treated participants.

When deciding which variables to include as covariates in the propensity model for social and behavioral research, Kelcey (2011) recommends using pre-test measures of potential outcome variables. In addition, other researchers suggest that any covariate that might differentiate the two groups, regardless of whether it is significantly related to the outcome variable, should be included in the propensity model (Linden et al., 2005; Rubin & Thomas, 1996). Therefore, any pre-treatment variable represented in the MEDai dataset that had some degree of variation was selected to estimate the propensity model (see Table 3-2). There were several variables in the original dataset where little if any claims were reported (e.g., total costs for leukemia, total costs for AIDS); therefore they were not included in the propensity model because they would not differentiate participants. Propensity score modeling was conducted in R using the *MatchIt* package (Ho, Imai, King, & Stuart, 2011). The matched sample resulted in 964 untreated participants and 300 treated participants (23 were unmatched using the .20 caliper).

Once the matched sample was created, baseline characteristics were assessed to ensure they were similarly distributed between the treated and untreated groups across the range of variables included in the propensity scoring algorithm in order to verify that the propensity model was appropriately specified. Based on recommendations by Linden et al. (2005) and Austin (2008a), a qualitative comparison was made between the distributions of baseline covariates between the two groups through an examination of the histogram (Figure 1), jitter plot (Figure 2), and Q-Q plots (Appendix A). The histogram shows that the distribution of propensity scores for the matched treated and control groups are more similar than those of the original (raw) treated and control groups. For the jitter plot, each circle represents a case's propensity score. This plot provides

Table 3-2 Baseline Variables Used as Covariates in the Propensity Model

	Variable Name	Description
Medical Claims Data	Acute index	Members are ranked according to their potential to reduce costs associated with acute care (e.g., ER and inpatient activity).
	Chronic disease index	Members are ranked according to their potential to reduce costs associated with chronic diseases.
	Depressed (yes or no)	Presence of a diagnosis of depression
	Forecasted risk index	Member's forecasted cost divided by the population's forecasted cost
	Motivation index	Members are ranked according to their potential to self-manage their healthcare, comply with instructions from healthcare providers, and pursue ways to improve their health status.
	Number of consultations	Count of consultations per member
	Number of ER outpatient claims	Count of outpatient emergency room visits that does not include ER visits resulting in admissions
	Number of medical claims	Count of distinct medical claims for each member
	Number of months worth of claims data	Number of months enrolled in the health plan
	Number of prescriptions	Count of distinct pharmaceutical prescriptions for each member
	Number of unique diagnoses	Count of distinct valid diagnoses
	Obese (yes or no)	Presence of a diagnosis related to obesity
	Projected antidepressant costs	Forecasted dollars associated with antidepressants
	Projected anxiety costs	Forecasted dollars associated with anxiety
	Projected COPD costs	Forecasted dollars associated with COPD
	Projected depression costs	Forecasted dollars associated with depression
	Projected ER costs	Forecasted dollars associated with ER visits
	Projected obesity costs	Forecasted dollars associated with obesity
	Projected total healthcare costs	Total forecasted dollars associated with all healthcare claims
	Projected smoker costs	Forecasted dollars associated with smoking
	Projected type 2 diabetes costs	Forecasted dollars associated with type 2 diabetes
	Smoker (yes or no)	Presence of any diagnosis reflecting a history of or a current dependence to tobacco
	Total healthcare costs	Total amount paid for all healthcare claims
	Total costs for COPD	Total amount paid for COPD-related claims
	Total costs for diabetes	Total amount paid for diabetes-related claims
	Total costs for ER visits	Total amount paid for ER visits
	Total costs for inpatient physician visits	Total amount paid for inpatient physician visits
	Total costs for outpatient ER visits	Total amount paid for outpatient ER visits
	Total costs for outpatient physician visits	Total amount paid for outpatient physician visits
	Total costs for pharmacy	Total amount paid for pharmacy-related claims
	Total costs for preventive health	Total amount paid for preventive health-related claims (e.g., routine health visits, screenings)
	Total costs for psychiatry	Total amount paid for psychiatric-related claims
	Demographic Information	Age
Employer (exact match)		Member employer
Sex (exact match)		Member sex

further support that the distribution of propensity scores is very similar for the matched treated and control groups (it also depicts the distribution of scores for treated and control cases that were not matched). The Q-Q plots are “empirical quantile-quantile plots of each covariate [that are used] to check balance of marginal distributions” (Ho, et al., 2011, p. 23). The plots demonstrate improved balance for most, if not all, covariates. The table in Appendix B displays the mean scores for the original and matched coached and non-coached groups. Taken together, the graphs and chart illustrate that the matched treated and untreated groups are equivalent on the baseline characteristics, and the distribution of these characteristics are more normal as compared to the overall original sample.

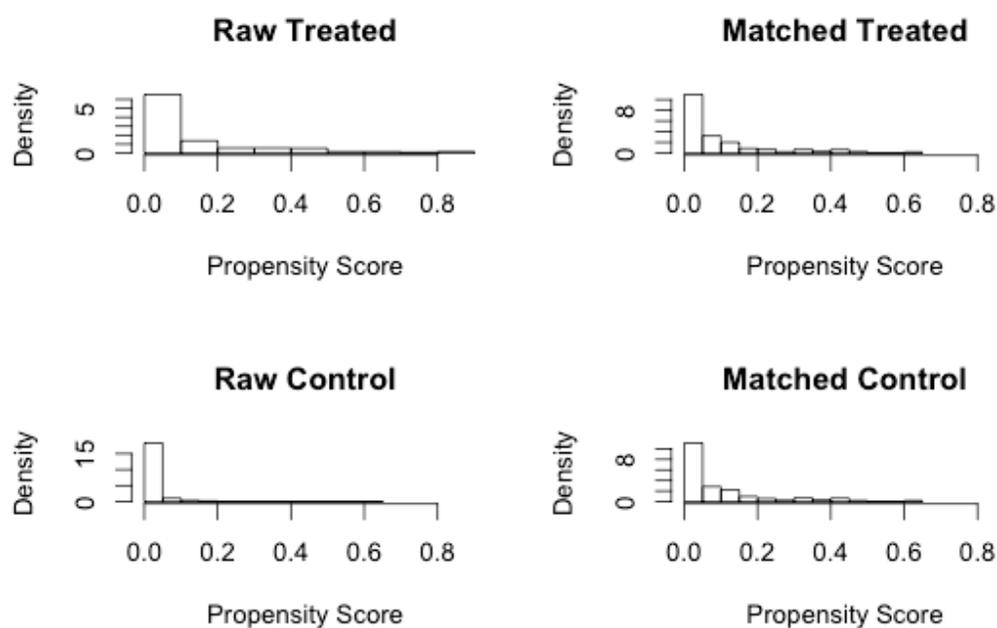


Figure 1 Histogram Comparing Propensity Scores Between Treated and Control Matched and Un-matched Samples

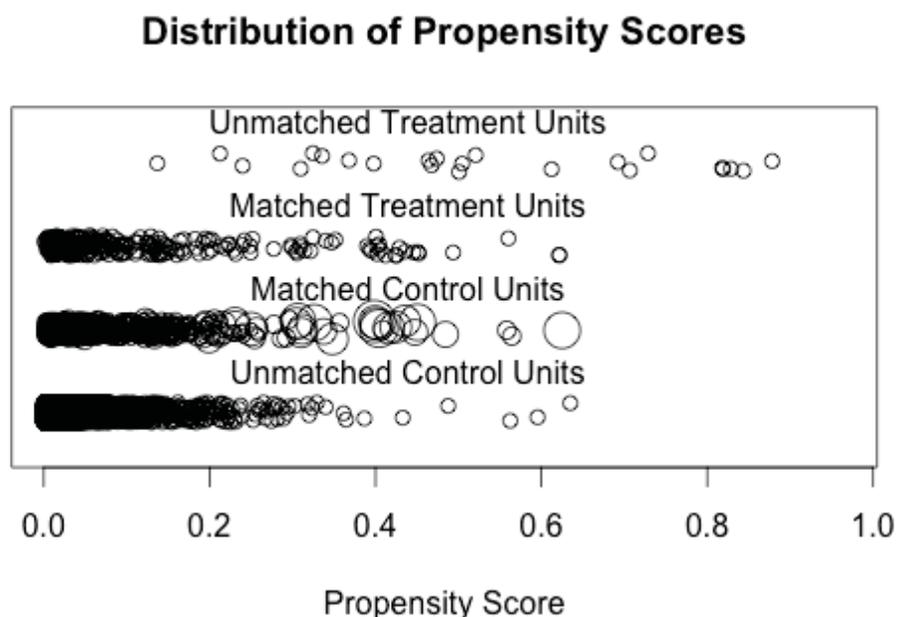


Figure 2 Jitter Plot Comparing the Overall Distribution of Propensity Scores Between Treated and Control Matched and Un-matched Samples

3.3 Measures

Several variables were drawn from the medical claims and wellness coaching data in order to address the proposed hypotheses and research questions.

3.3.1 Independent variables

3.3.1.1 Post-treatment distance

To determine the length of time since participants' last coaching session, participants' last coaching date was subtracted from the last date they were entered in the MEDai system. This variable will be referred to as post-treatment distance and is represented by the number of days between each date.

3.3.1.2 Coaching amount and density

The amount of coaching sessions was operationalized as the total number of attended coaching sessions. In order to identify whether an ideal number of coaching sessions leads to greater healthcare outcomes, this variable was also transformed into an ordinal variable. Based on recommendations made by the wellness coaching literature (Moore & Tschannen-Moran, 2010), interviews with wellness coaches, and an assessment of the distribution of coaching sessions, differences were compared between those who attended (1) one session ($N = 97$), (2) two to three sessions ($N = 106$), (3) four to five sessions ($N = 54$), (4) six to nine sessions ($N = 56$), and (5) ten or more sessions ($N = 46$). In order to calculate the distribution of coaching sessions, referred to as coaching density, the number of days between the first and last coaching dates was divided by the number of coaching sessions. Higher density scores indicate that participants attended their coaching sessions over a greater period of time.

3.3.1.3 Wellness goals

Participants' wellness visions were coded in order to categorize their long-term wellness goals. A coding scheme was created based off of the wellness coaching literature, which highlighted several common areas that clients wish to improve upon (Moore & Tschannen-Moran, 2010). Interviews with wellness coaches led to the inclusion of additional goal categories. The author and an independent coder then read through the participant wellness goals and added any missing categories to the coding scheme. This resulted in four broad categories that represented different types of wellness goals: improvements in (1) physical health, (2) mental wellbeing, (3) relational wellbeing

(e.g., repairing a relationship, spending more time with others), and (4) financial and professional wellbeing (e.g., getting finances in order, going back to school). Sub-categories were embedded within the physical health and mental wellbeing categories. The physical health sub-categories include: (1) improving exercise, nutrition and weight (e.g., increase physical activity, improve nutrition, lose weight), (2) improving a chronic condition (e.g., improve HbA1c levels, reduce medications), (3) improving sleep, and (4) quitting smoking. The mental wellbeing sub-categories include: (1) reducing negative mental states (e.g., reduce depression/anxiety/stress, cope with issues from the past), (2) increasing internal positivity (e.g., improve body image, be happier, feel more confident), (3) improving work/life balance and quality of life (e.g., increase hobbies, work less), and (4) getting organized/de-cluttering.¹ Scores for wellness goals represent the presence (“1”) or absence (“0”) of each particular goal. As such, wellness vision codes were not mutually exclusive. In other words, it was possible to have multiple goal categories in each vision statement. For the complete coding manual, see Appendix C.

Once the coding scheme was finalized, all wellness visions were coded. The author coded all vision statements and the coder independently coded 20% of the wellness visions to assess inter-rater reliability. Cohen’s kappa was used, which is a more conservative and preferred index of intercoder agreement that controls for coder agreement expected based on chance (see Dewey, 1983). Landis and Koch (1977) suggest that kappa coefficients ranging from .41-.60 represent moderate agreement, coefficients ranging from .61-.80 represent substantial agreement, and coefficients ranging from .81-1.00 represent almost perfect agreement. Results of the reliability analyses revealed very strong consistency between the two coders, with Cohen’s kappa

coefficients ranging from .54 – 1.00 for all categories (see Table 3-3). The work/life balance and quality of life code was the only category that reached moderate agreement, some codes reached substantial agreement, and the majority of codes reached almost perfect agreement, thus demonstrating that the wellness vision coding scheme is highly reliable across coders more so than would be expected by chance.

Table 3-3 Reliabilities of Wellness Vision Coding Scheme

	Cohen's kappa
Physical health	.80
Exercise, nutrition, weight	.83
Chronic conditions	.77
Sleep	.88
Smoking	1.00
Mental wellbeing	.86
Reduce negative state	.90
Increase internal positivity	.76
Work/life balance & quality of life	.54
Organize/de-clutter	.79
Relational wellbeing	.61
Financial & professional wellbeing	.93

3.3.1.4 Wellness complexity

Wellness complexity is conceptualized as the number of distinct wellness issues an individual is attempting to manage during their wellness coaching sessions. Two wellness complexity variables were created: *broad wellness complexity* represents the sum of the four overarching wellness vision categories (i.e., physical, mental, relational and financial/professional wellbeing), and *specific wellness complexity* represents the sum of the four physical and four mental sub-categories along with the relational and financial/professional broad categories. The broad wellness complexity score, ranging from 0-4, represents the general areas that clients wish to address during the intervention,

whereas the specific wellness complexity, ranging from 0-10, more accurately represents the actual number of distinct issues a client wishes to address in their sessions.

3.3.1.5 Health risk status

MEDai developed a health risk status variable, wherein members are ranked in terms of their forecasted costs and are assigned a percentile with the highest risk members residing in the 100th percentile. Percentiles are then categorized into five levels, with level five representing members with the greatest health risk.

3.3.2 Dependent variables

The relevant healthcare outcomes taken from the medical claims dataset were selected because they represent common chronic diseases (e.g. diabetes, mental illness), might highly impact one's overall medical costs (e.g., prescriptions, number of medical claims), or indicate improvements to self-management practices (e.g., preventive health costs, motivation index). It should be noted that pre-treatment scores for the relevant outcome variables were included in the propensity model while post-treatment scores were used for the dependent variables.

3.3.2.1 Healthcare outcome categories

Dependent variables were categorized based on MEDai's operationalization of each variable. More specifically, the total cost variables reflect the actual amount of money paid for healthcare services (e.g., diabetes, pharmacy, preventive health, psychiatry, total healthcare costs). The total count variables represent the amount of healthcare utilization (e.g., number of medical claims and prescriptions) but do not reflect costs of such utilization. For the projected risks/savings variables, proprietary MEDai

algorithms are used to compute the amount of money clients are predicted to spend (e.g., forecasted risk index, projected total healthcare costs) and save (e.g., acute and chronic disease index) on healthcare services based on their current and previous medical claims. For motivation index, proprietary MEDai algorithms are used to compute a variable intended to represent a client's potential to self-manage their healthcare, comply with instructions from healthcare providers, and pursue ways to improve their health status. This index is different from the other indices in the dataset because it relies on a more extensive list of factors that could potentially influence a client's improved utilization of healthcare services (e.g., demographic characteristics, the presence/absence of certain health conditions). Because this index relies on medical claims data to infer one's motivation to engage with the healthcare system, it is distinct from more direct assessments of motivation found in social and behavioral research. A complete list of relevant outcome variables with descriptions is presented in Table 3-4.

3.3.2.2 Patient engagement

Four variables will be used as indirect measures of improved patient engagement with the healthcare system: total costs for preventive health, acute index, chronic disease index, and motivation index. Higher values represent improved patient engagement with the healthcare system. Given that these variables are computed based on proprietary MEDai formulas, it is difficult to determine the specific factors that influence these measures. However, these indices are frequently used by healthcare professionals to identify clients that are successfully engaging with the healthcare system by utilizing preventive health services and adhering to treatment recommendations (e.g., filling

Table 3-4 Relevant Post-Treatment Healthcare Outcome Variables

Variable Category	Variable Name	Description
Total cost variables	Diabetes	Total amount paid for diabetes-related claims
	Pharmacy	Total amount paid for pharmacy-related claims
	Preventive health	Total amount paid for preventive health-related claims (e.g., routine health visits, screenings). <i>Higher scores indicate an improvement in patient engagement.</i>
	Psychiatry	Total amount paid for psychiatric-related claims
	Total healthcare costs	Total amount paid for all healthcare claims
Total count variables	Number of medical claims	Count of distinct medical claims for each member
	Number of prescriptions	Count of distinct pharmaceutical prescriptions for each member
Projected risks/savings variables	Acute index	Members are ranked according to their potential to reduce costs associated with acute care (e.g., ER and inpatient activity). <i>Higher scores indicate an improvement in patient engagement.</i>
	Chronic disease index	Members are ranked according to their potential to reduce costs associated with chronic diseases. <i>Higher scores indicate an improvement in patient engagement.</i>
	Forecasted risk index	Member's forecasted cost divided by the population's forecasted cost
	Projected total healthcare costs	Total forecasted dollars associated with all healthcare claims
Other variables	Motivation index	Members are ranked according to their potential to self-manage their healthcare, comply with instructions from healthcare providers, and pursue ways to improve their health status. <i>Higher scores indicate an improvement in patient engagement.</i>

necessary prescriptions, attending scheduled doctor's appointments), which help mitigate against higher future healthcare costs. Despite the lack of specificity regarding what is

used to compute these variables, correlations of the baseline values of these indicators demonstrate that these variables are all significantly positively related to each other (see Table 3-5), which provides increased confidence that these MEDai variables do in fact represent indices of improved patient engagement.

Table 3-5 Baseline Value Correlations of Indicators of Patient Engagement

	1	2	3
1 Acute index			
2 Chronic disease index	.45*		
3 Motivation index	.39*	.33*	
4 Total costs for preventive health	.09*	.13*	.25*

Note. * $p < .01$

Higher values of the remaining dependent variables represent an increase in healthcare costs, risks and utilization. It is likely that increases in these remaining variables also indicate an increase in patient engagement. For example, someone who is diabetic that has improved their attendance of doctor's appointments and increased the frequency with which they fill their prescribed medications should see an increase in their total costs for diabetes and pharmacy, which would represent a good healthcare expense because they are improving adherence to medical treatment. However, someone who experienced complications because of their diabetes may also see an increase in their total costs for diabetes and pharmacy, which may represent a bad healthcare expense. Given the nature of this medical claims data, it is difficult to determine whether the total and projected costs and utilization variables represent better or worse healthcare outcomes. Thus, total costs for preventive health, acute index, chronic disease index, and motivation index will be more accurate representations of patient engagement compared to the remaining dependent variables.

3.3.2.3 Pre- and post-treatment values

To identify participants' baseline values for each variable, the value associated with the first medical claims entry was recorded. Similarly, the value associated with the last medical claims entry represented participants' post-treatment scores. Each value represents a rolling 12-month average. In other words, each value depicts the average of actual and projected costs for the past year. Because participants entered and left the MEDai system at various points in time, the rolling 12-month average may misrepresent the actual claims for participants who were not in the system for the full 12-months. Thus, in order to ensure these averages accurately represent actual and projected costs, all variables associated with current and projected costs were converted into monthly averages by dividing their value with the number of months they were enrolled in the MEDai system at the time of their pre- and post-treatment scores. All index (acute, chronic disease, forecasted risk, and motivation) and count (number of medical claims and prescriptions) variables were left in their original form.

In sum, this chapter reviewed the methodologies used to address the proposed hypotheses and research questions. The next chapter will then discuss the results of the analyses conducted to test these questions.

CHAPTER 4. RESULTS

The purpose of this chapter is to analyze the effects that participation in wellness coaching, along with coaching and client variation, have on healthcare outcomes including healthcare costs, risks and behaviors. Additional goals are to explore the types of wellness visions that participants in this intervention have. To address these issues, a number of statistical tools are used including analyses of covariance (ANCOVA), multivariate analyses of covariance (MANCOVA), negative binomial regressions, and partial correlations. Issues involving violations of assumptions of normality will be discussed first. Hypotheses and research questions will then be analyzed in the order in which they were presented in Chapter 2, each followed by a succinct summary of the findings.

4.1 Descriptive Statistics and Normality

Table 4-1 presents a summary of the baseline demographic characteristics for coached and non-coached participants. Dependent variables were assessed for normality. All medical claims data calculated based on cost and count were positively skewed and leptokurtic. Following recommendations made by health economists (see Munro, 2005), all cost variables including forecasted risk index, which is computed based on projected

Table 4-1 Baseline Demographic Characteristics of Coached versus Non-coached Participants

Variable	Coached	Non-coached
Age in years	46.09 (11.39)	44.15 (14.04)
Female	73.7	70.2
Employer category		
Manufacturer	19	22.3
Hospital	26.3	28.2
Government	3.7	4.5
School corporation	51	45
Health risk status		
1	10	15.1
2	19	28.1
3	36.3	28.8
4	22.7	18.7
5	12	9.2

Note. Variables followed with values in parentheses are continuous with means and standard deviations, and categorical variables are expressed as percentages.

costs, were transformed using the following formula: $\log_{10}(\text{original variable} + 1)$. A constant (1) is added when variables contain zero, because the log of zero is undefined (see McDonald, 2009). Although some variables still exhibited signs of skewness and leptokurtosis, the log transformations improved the distribution for all cost variables, with most reaching standard conventions of normality, thus these log transformed variables were used in all analyses. See Table 4-2 for descriptive statistics on independent and original and log transformed dependent variables.

In order to analyze data with count dependent variables (i.e., number of medical claims and prescriptions), negative binomial regressions were run. This method is preferred over the Poisson method when the variable is overdispersed, that is, the variance is greater than the mean, which was the case for both count variables. The negative binomial distribution has one more parameter than the Poisson regression, and

Table 4-2 Post-treatment Descriptive Statistics for Original and Log Transformed Variables

	Min	Max	<i>M</i>	<i>SD</i>	<i>Skew</i>	<i>Kurtosis</i>
Post-treatment distance (in days)	20	958	357.22	276.76	.51	-.82
Number of coaching sessions	1	66	5.25	7.56	4.34	24.76
Coaching density (in days)	.00	225.40	20.96	29.58	3.21	14.06
Broad wellness complexity	.00	4	1.66	.79	.87	.01
Specific wellness complexity	.00	7	2.16	1.15	1.12	1.52
Total paid for diabetes						
Original	.00	2007.25	14.30	102.19	11.92	179.71
Log transformed	.00	3.30	.13	.50	4.07	16.03
Total paid for pharmacy						
Original	-.17	4794.35	75.08	287.34	10.22	134.94
Log transformed	-.08	3.68	.89	.92	.59	-.88
Total paid for preventive health						
Original	-.17	407.00	8.15	29.78	9.05	99.16
Log transformed	-.08	2.61	.36	.60	1.36	.56
Total paid for psychiatry						
Original	.00	1887.83	14.93	84.40	12.55	222.83
Log transformed	.00	3.28	.26	.61	2.44	5.14
Total healthcare costs						
Original	-.08	10567.19	378.13	1063.28	5.42	34.67
Log transformed	-.04	4.02	1.60	1.08	-.17	-.95
Projected total healthcare costs						
Original	21.92	8502.25	398.38	559.13	5.58	49.36
Log transformed	1.36	3.93	2.40	.39	.29	.42
Forecasted risk index						
Original	.09	33.32	1.57	2.20	5.55	48.81
Log transformed	.04	1.54	.34	.21	1.52	3.30
Acute index	1.00	100.00	59.28	19.89	-.56	.09
Chronic disease index	.00	100.00	49.68	44.14	-.21	-1.91
Motivation index	.00	2.34	1.04	.52	-.36	.04
Number of medical claims	.00	250	14.54	21.65	4.89	38.07
Number of prescriptions	.00	45	6.56	7.00	1.52	2.57

adjusts the variance independently from the mean, thus allowing it to be more flexible in response to overdispersion (Neal & Simons, 2007).

To check for multivariate normality, Mahalanobis distances were calculated for the group of cost and risk/savings variables, separately. According to Tabachnick and Fidell (2007), the critical value to determine multivariate outliers was 20.52 for the five cost variables and 18.47 for the four projected risk/savings variables. Thirty-three participants had values higher than 20.52 for the cost analysis, and 35 had values higher

than 18.47 for the risk/savings analysis; thus, these analyses were run both with and without outliers. Due to minimal differences in overall results between analyses including and excluding outliers, subsequently reported analyses retain outliers to better reflect the variation within the underlying data.

Additional assumption checking was conducted for all analyses with no serious violations. Although Box's test of equality of covariance for all MANCOVAs and Levene's test of equality of error variances for all ANCOVAs were significant at the $p < .01$ level, Tabachnick and Fidell (2007) state that it is common for these tests to find differences when large sample sizes are used.

4.2 H1: Influence of Participation in Wellness Coaching on Healthcare Outcomes

Hypothesis 1 stated that participants in a wellness coaching program will exhibit differences in healthcare outcomes compared to similar others who have not participated in a wellness coaching program. In order to test this hypothesis, two factorial MANCOVAs, two negative binomial regressions, and a factorial ANCOVA were performed. In all analyses, participation in the coaching intervention, participant sex, and health risk status served as independent variables. The interaction effects of coaching by sex and coaching by health risk status will be discussed in response to RQ6 and RQ7, respectively. Age was correlated with all of the dependent variables, with the exception of total costs for preventive health and psychiatry. Thus, it was included as a covariate in all analyses, except when total costs for preventive health and psychiatry were analyzed separately because of its non-significant correlations. All baseline values for the dependent variables were also included as covariates in each analysis due to their high correlation with post-treatment values.

The first MANCOVA was run on the five healthcare cost dependent variables: total healthcare costs and total costs for diabetes, pharmacy, preventive health, and psychiatry. Results revealed a non-significant difference between coached and non-coached participants on the combined effects of healthcare costs, $F(5, 1234) = 1.95, p = .08$; Pillai's Trace = .01; partial $\eta^2 = .01$.²

For the second MANCOVA, four projected risk/savings dependent variables were used: acute index, chronic disease index, forecasted risk index, and projected total healthcare costs. Significant differences were found between coached and non-coached participants on the combined variables, $F(4, 1236) = 9.09, p < .01$; Pillai's Trace = .03; partial $\eta^2 = .03$. Results of the dependent variables were considered separately using a Bonferroni adjusted alpha level of .013, as per recommendations by Tabachnick and Fidell (2007). All four variables reached statistical significance (see Table 4-3). An examination of the means indicate that coaching led to increases in projected total healthcare costs and forecasted risk. Coaching was also associated with an increase in acute and chronic disease indices, suggesting that participants had higher levels of improved patient engagement.

Table 4-3 Main Effects of Factorial MANCOVA for Projected Risks/Savings Variables

	Coached <i>M</i> (<i>SE</i>) [†]	Non-coached <i>M</i> (<i>SE</i>) [†]	F (1, 1239)	<i>p</i>	Partial η^2
Acute index	64.51 (1.34)	58.12 (.66)	20.10	.00***	.02
Chronic disease index	62.12 (3.25)	46.89 (1.61)	19.41	.00***	.02
Forecasted risk index	.38 (.02)	.33 (.01)	9.09	.00**	.01
Projected total healthcare costs	2.50 (.03)	2.38 (.01)	17.61	.00***	.01

Note. [†]Estimated marginal means and standard errors are reported with baseline values of dependent variables and age as covariates. ** $p < .01$ *** $p < .001$

To test the effects that participation in a coaching intervention has on the number of medical claims and prescriptions, separate negative binomial regressions with log links were run. This method produces exponentiated coefficients or incident rate ratios (IRR), which represent the rate of change in the outcome variable for each one point increase in the predictors, akin to an odds-ratio. As such, IRRs between 0 and 1 indicate an inverse relationship and IRRs greater than 1 reflect a positive relationship between the predictor and outcome (Collins et al., 2009).

Results demonstrated that coaching had a significant effect on number of medical claims, $\chi^2(1, N = 1264) = 27.56, p < .01$, and prescriptions, $\chi^2(1, N = 1264) = 13.05, p < .01$. There was a positive effect for number of medical claims ($IRR = 2.60, SE = .33, p < .01$) and number of prescriptions ($IRR = 2.27, SE = .35, p = .02$). Thus, participation in coaching led to an increase in both number of medical claims and prescriptions.

Finally, an ANCOVA was run on motivation index. Results approached significance, $F(1, 1242) = 3.67, p = .056$; partial $\eta^2 = .003$. Inspection of mean scores suggests a slight improvement to motivation index for coached ($M = 1.09, SE = .04$) compared to non-coached ($M = 1.01, SE = .02$) participants, however this effect is very small.

4.2.1 Summary of Hypothesis 1 results

Participation in a wellness coaching intervention does have an impact on healthcare outcomes, thus supporting Hypothesis 1. Results revealed no significant differences between coached and non-coached participants on current healthcare costs, however coached participants have higher numbers of medical claims and prescriptions. There is also a significant increase in projected healthcare costs for coached participants.

Finally, coached participants saw an increase in acute and chronic disease indices; in other words, they improved their patient engagement.

4.3 H2: Mediators Between Coaching and Healthcare Outcomes

It is possible that the increase in healthcare utilization (i.e., number of medical claims and prescriptions) and projected costs (i.e., total projected healthcare costs and forecasted risk index), as demonstrated in Hypothesis 1, is due in part to the increase in patient engagement (i.e., acute and chronic disease indices) following a coaching intervention. Thus, Hypothesis 2 proposed that indicators of improved participant engagement behaviors would mediate the relationship between coaching and healthcare costs, risks and utilization. To test this hypothesis, separate multiple parallel mediation models were run on each dependent variable using the PROCESS macro developed by Hayes (2013). Results were based off of bias-corrected bootstrap confidence intervals by utilizing 10,000 bootstrap samples. Confidence intervals for the indirect effect were assessed to determine whether each variable served as a significant mediator. Those that did not contain zero are considered significant mediators. The independent variable was the coaching intervention and the mediators were total costs for preventive health, acute index, chronic disease index, and motivation index. The dependent variables that were assessed were: total healthcare costs, projected total healthcare costs, total costs for diabetes, psychiatry and prescriptions, number of medical claims and prescriptions.³ All analyses controlled for age and baseline values for the dependent and mediator variables.

Results of the mediation analyses are presented in Table 4-4 (see also Figure 3 for the path model). Motivation index was not a significant mediator between wellness coaching and any of the dependent variables. Total costs for preventive health was a

Table 4-4 Results of Mediation Analyses Predicting Healthcare Outcomes

Mediators	Outcome Variables						
	Health cost	Proj. health cost	Diab. cost	Psych. cost	Rx cost	# Med. clms.	# Rx
Prev. health cost							
a ₁ β	.090*	.090*	.090*	.091*	.090*	.087*	.089*
b ₁ β	.345***	.051***	-.021	.107***	.151***	.398***	.115**
a ₁ *b ₁ β	.031	.005	-.002	.010	.014	.035	.010
a ₁ *b ₁ [95% CI]	[.004, .060]†	[.001, .010]†	[-.007, .001]	[.002, .024]†	[.002, .031]†	[.006, .076]†	[.002, .027]†
Acute index							
a ₂ β	6.297***	6.095***	6.310***	6.364***	6.387***	6.278***	6.321***
b ₂ β	.032***	.014***	.002**	.008***	.014***	.064***	.027***
a ₂ *b ₂ β	.202	.086	.015	.052	.091	.399	.172
a ₂ *b ₂ [95% CI]	[.139, .272]†	[.058, .115]†	[.006, .028]†	[.034, .075]†	[.064, .128]†	[.262, .525]†	[.120, .230]†
Chron. dis. index							
a ₃ β	15.374** *	15.074***	15.200***	15.408***	15.331***	15.454***	15.358***
b ₃ β	.001*	.001***	.001*	.002***	.002***	.012***	.010***
a ₃ *b ₃ β	.021	.018	.010	.030	.028	.191	.152
a ₃ *b ₃ [95% CI]	[.003, .043]†	[.011, .027]†	[.003, .019]†	[.016, .048]†	[.011, .051]†	[.131, .274]†	[.102, .206]†
Motivation index							
a ₄ β	.015	.013	.012	.013	.016	.014	.017
b ₄ β	.351***	.016	.103***	-.204***	.472***	-.304**	.228***
a ₄ *b ₄ β	.005	.000	.001	-.003	.007	-.004	.004
a ₄ *b ₄ [95% CI]	[-.015, .026]	[-.001, .002]	[-.005, .008]	[-.016, .009]	[-.020, .035]	[-.029, .012]	[-.010, .019]
Direct effect							
c' β	.004	.005	-.006	-.033	-.023	.536***	.118*

Note. Prev. health cost = Total costs for preventive health. Chron. dis. index = Chronic disease index. Health cost = Total healthcare costs. Proj. health cost = Projected total healthcare costs. Diab. cost = Total cost for diabetes. Psych. cost = Total cost for psychiatry. Rx cost = Total costs for pharmacy. # Med. Clms = Number of medical claims. # Rx = Number of prescriptions. a₁₋₄*b₁₋₄ = Indirect effect. All analyses contained age and baseline values of the dependent and mediator variables as covariates.

†Significant mediator (confidence interval for a₁₋₄*b₁₋₄ does not contain zero), *p < .05, **p < .01, ***p < .001.

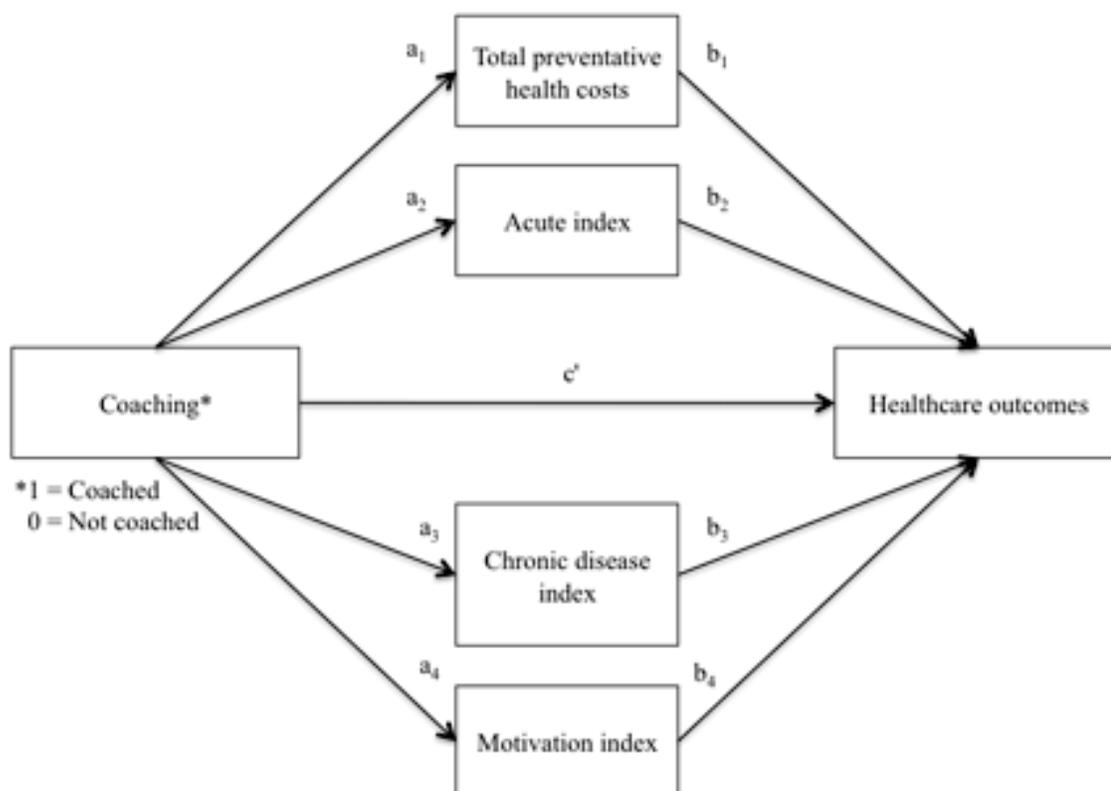


Figure 3 Parallel Mediation Model Predicting Healthcare Outcomes (see Table 4-4 for path, direct, and indirect effects).

significant mediator for all dependent variables with the exception of total costs for diabetes. Finally, acute index and chronic disease index mediated all dependent variables.

In order to help with the interpretation of the results, two examples from the mediation analyses displayed in Table 4-4 will be highlighted. The results suggest that participation in a coaching intervention is associated with higher levels of acute index. In other words, coaching is associated with a greater potential for participants to save money on acute care. This increase in acute index is positively associated with participants' current total healthcare costs, implying that increased patient engagement is positively

associated with total healthcare costs. Taken together, wellness coaching is associated with an increase in acute index, which is associated with an increase in total healthcare costs. As for another example, coaching is positively associated with participants' total costs for preventive health services. In other words, participants are more inclined to get preventive services (e.g., health screenings) following a coaching intervention. This increased cost in preventive health is positively associated with projected total healthcare costs. In other words, participants who increase their use of preventive services are expected to have higher total healthcare costs in the future. Taken together, wellness coaching is associated with increased total costs for preventive health, which is associated with increased total projected healthcare costs.

It should be noted that even though the direct effect for all cost variables (e.g., total costs for diabetes, psychiatry, etc.) were non-significant, the patient engagement indicators can still serve as significant mediators. Hayes (2013) reasons that in order to test whether a variable mediates the relationship between an independent and dependent variable, one must look only at the product of paths *a* and *b* rather than drawing inferences of the presence of mediation based on the effects of individual pathways (see Figure 4). He states that in contrast to the test of indirect effects, the total and direct effects are less powerful tests and thus are subject to Type 2 errors (i.e., failure to detect a difference when one does in fact exist). There could be multiple explanations for why a direct effect was non-significant; in this case it could be a function of the weak associations between the coaching intervention and healthcare costs, suggesting that a relationship only exists between coaching and healthcare costs when the mediating variable is present. In sum, despite the non-significant direct effects, the significant

indirect effects suggest that acute index, chronic disease index, and total costs for preventive health serve as mediators between participation in a wellness coaching intervention and healthcare outcomes.

4.3.1 Summary of Hypothesis 2 results

Results suggest that indicators of patient engagement mediate the relationship between wellness coaching participation and healthcare outcomes, thus supporting Hypothesis 2. The impact of coaching on total and projected costs and number of medical claims and filled prescriptions appears to be explained by its relationship with patient engagement measures. More specifically, results indicate that coaching is associated with improved patient engagement, which is positively associated with total and projected healthcare costs and utilization. Possible explanations for why motivation index was not a significant mediator in these analyses will be discussed in Chapter 5.

4.4 RQ1: Time Since Last Coaching Session on Healthcare Outcomes

The results of Hypothesis 2 suggest that participation in coaching is associated with an increase in patient engagement, which is associated with an increase in current and predicted healthcare costs and utilization. It is plausible that this initial increase will result in healthcare savings down the road. Thus, Research Question 1 asked whether the time since participants' last coaching session would be associated with healthcare outcomes. Partial correlations and negative binomial regressions were conducted to test this research question for the coached only group. Post-treatment distance was used as the independent variable. The dependent variables were: total healthcare costs, projected total healthcare costs, total costs for diabetes, psychiatry and prescriptions, and number of medical claims and prescriptions. Baseline values of all dependent variables were

controlled for. Age was also treated as a covariate except in analyses involving total costs for preventive health and psychiatry because of its non-significant correlations. Sex was controlled for in analyses involving total costs for healthcare, total costs for diabetes, preventive health and psychiatry, and chronic disease index as it was related to these variables.

Results of the partial correlations are presented in Table 4-5. There was a negative association between post-treatment distance and healthcare outcomes, including total costs for diabetes and psychiatry, projected total healthcare costs, and forecasted risk index. Results of the negative binomial regression analyses indicate that coaching distance was not significantly related to number of medical claims, $\chi^2(1, N = 323) = 1.77$, $p = .183$, or prescriptions, $\chi^2(1, N = 323) = 3.74$, $p = .053$. It should be noted that although the results for number of prescriptions approached significance, its *IRR* equaled 1.00, indicating no difference between levels of coaching distance .

Table 4-5 Partial Correlations for Distance from Last Coaching Session

	Distance
Total healthcare costs ^{ab}	-.089
Total costs for diabetes ^{ab}	-.115*
Total costs for psychiatry ^b	-.143**
Total costs for pharmacy ^a	-.099
Projected total healthcare costs ^a	-.162**
Forecasted risk index ^a	-.153**

Note. All analyses were controlled for baseline values of the dependent variable. ^aAge as covariate. ^bSex as covariate. * $p < .05$, ** $p < .01$.

These results suggest that as time since intervention increases, healthcare costs decrease. This lends support for what was originally posited, that is, because coaching is associated with improved patient engagement, which is associated with initial increases in healthcare costs and utilization, over time these initial costs will turn into eventual

savings. Of course another possibility is that the more time that passes since participants attended a coaching intervention, the less likely they are to engage in the healthcare system (e.g., attending necessary doctor's appointments, getting annual check-ups), which would lead to lower healthcare costs. One way to test which possibility best explains the current results is to run additional correlation analyses on post-treatment distance and indicators of patient engagement. As such, partial correlations were run with post-treatment distance serving as the independent variable and acute index, chronic disease index, motivation index, and total costs for preventive health serving as the dependent variables. Baseline values of the dependent variables were included as covariates; age was also added as a covariate in all analyses except for total costs for preventive health, because of its non-significant correlation. Results show that post-treatment distance is not significantly related to chronic disease index ($r = -.01, p = .83$), motivation index ($r = .00, p = 1.00$), and total costs for preventive health ($r = -.09, p = .09$). There was a significant association between post-treatment distance and acute index ($r = -.12, p = .04$).

Despite the decrease in acute index, the results largely support the notion that as time since intervention increases, there is no effect on participants' level of patient engagement. Based on these results, it is more likely that the negative association between post-treatment distance and healthcare costs is best explained by the fact that it may take time for the effects of a coaching intervention to manifest itself in healthcare cost savings, rather than having the results be a result of a decrease in patient engagement over time. Thus, this decrease in healthcare costs is more likely due in part to the initial increase in patient engagement, which is associated with increased costs up-front, but

over time the improved engagement in healthcare services may lead to lowered healthcare costs. In addition, an increase in post-treatment distance has largely no effect on patient engagement for coached participants.

4.4.1 Summary of Research Question 1 results

Results revealed that as more time passed from the date of the last coaching session, the lower participant total and projected healthcare costs were. Because post-treatment distance was largely unrelated to indicators of patient engagement, this decrease in healthcare costs is most likely not a function of a decrease in patient engagement. It should be noted that a trend analysis should be conducted to more accurately assess longitudinal changes, however this, along with the results of Hypotheses 1 and 2, provide initial support for the possibility that participants in a wellness coaching intervention will see an initial increase in healthcare costs, which is influenced by their increased engagement, that may then result in a decline in healthcare costs over time.

4.5 RQ2: The Effects of Coaching Amount and Density on Healthcare Outcomes

Research Question 2 asked whether there was an association between the amount and density of wellness coaching sessions and healthcare outcomes. This question was addressed in multiple ways. First, partial correlations and negative binomial regressions were run with number of coaching sessions and coaching density serving as independent variables. In order to identify if there is a certain number of coaching sessions that has the greatest effect on healthcare outcomes, the number of coaching sessions variable was separated into five groups (1, 2-3, 4-5, 6-9, and 10 or more). This served as an independent variable in two MANCOVAs, two negative binomial regression analyses, and one ANCOVA.

For the partial correlation and negative binomial regression analyses where number of coaching sessions and density served as continuous independent variables, covariates were added including age – except in analyses involving total costs for preventive health and psychiatry because of its non-significant correlations – and baseline values for all dependent variables. Sex was correlated with chronic disease index, total healthcare costs, and total costs for diabetes, preventive health, and psychiatry, thus it was included as a covariate for these analyses. For analyses where number of coaching sessions served as an ordinal independent variable, all baseline values for dependent variables and age were controlled for because of its significant correlations.

Results of the partial correlation analyses are presented in Table 4-6. These results suggest that number of coaching sessions is positively related to total costs for psychiatry and pharmacy, projected total healthcare costs, forecasted risk index, and acute index. In other words, a greater amount of coaching was associated with an increase in total and projected healthcare costs, as well as an increase in potential savings for acute care. Coaching density was positively associated with total costs for psychiatry and negatively associated with motivation index. The large amount of non-significant results related to coaching density may have been a function of outliers, mainly by those participants who attended one coaching session and did not return for consecutive sessions until much later. Thus, analyses were run with 25 outliers removed. All results remained about the same, except that the two significant density effects became non-significant (see the note for Table 4-6). Based on these results, it is more likely that coaching density has limited impact, if any, on healthcare outcomes among these participants.

Table 4-6 Partial Correlations for Amount and Density of Coaching

	Amount	Density
Total healthcare costs ^{ab}	.079	-.034
Total costs for diabetes ^{ab}	.095	-.095
Total costs for preventive health ^b	-.057	-.058
Total costs for psychiatry ^b	.104*	.105*†
Total costs for pharmacy ^a	.167**	-.003
Projected total healthcare costs ^a	.153**	.044
Forecasted risk index ^a	.145**	.030
Acute index ^a	.132*	.048
Chronic disease index ^{ab}	.079	.100
Motivation index ^a	.008	-.198****

Note. All analyses were controlled for baseline values of the dependent variable. ^aAge as covariate. ^bSex as covariate. †After removing outliers, $r = -.048$, $p = .41$. *After removing outliers, $r = -.093$, $p = .115$. * $p < .05$, ** $p < .01$, *** $p < .001$.

To test the effects of the amount and density of coaching on the number of medical claims and prescriptions, separate negative binomial regressions with log links were run. Number of coaching sessions significantly predicted number of medical claims, $\chi^2(1, N = 359) = 13.09$, $p < .01$, and prescriptions, $\chi^2(1, N = 359) = 5.47$, $p = .02$. There was a positive effect for number of medical claims ($IRR = 1.03$, $SE = .01$, $p < .01$) and number of prescriptions ($IRR = 1.02$, $SE = .01$, $p = .02$). Thus, greater amounts of coaching sessions are associated with an increase in both number of medical claims and prescriptions. As for coaching density, there was a non-significant effect on number of medical claims, $\chi^2(1, N = 318) = 2.89$, $p = .09$, and prescriptions, $\chi^2(1, N = 318) = .54$, $p = .46$. Once again, analyses were run with outliers removed. Results for density on number of prescriptions remained non-significant, however the effects on number of medical claims became significant, $\chi^2(1, N = 293) = 5.46$, $p = .02$, with coaching density having a positive effect on number of medical claims ($IRR = 1.01$, $SE = .00$, $p = .02$).

Thus, the more disperse one's coaching sessions are, the more likely there will be an increase in medical claims, but only by about 1%.

To test whether there is an ideal number of coaching sessions that would maximize participant outcomes, the ordinal variable of number of coaching sessions was used as an independent variable in a MANCOVA with the five healthcare cost variables serving as the dependent variables: total healthcare costs and total paid for diabetes, pharmacy, preventive health, and psychiatry. Significant differences were found between number of coaching sessions on the combined variables, $F(20, 1220) = 2.51, p < .01$; Pillai's Trace = .16; partial $\eta^2 = .04$. Results of the dependent variables were considered separately using a Bonferroni adjusted alpha level of .01. Two dependent variables reached statistical significance (see Table 4-7). An examination of the means indicate that attending 10 or more sessions was associated with higher total costs for diabetes and pharmacy compared to those who attended 5 or less sessions. Those who attended 2-3 sessions also saw a decrease in diabetes-related costs compared to those who attended 6-9 sessions. In addition, those who attended 4-5 sessions increased their costs for diabetes compared to those who attended 6-9 sessions.

Table 4-7 Main Effects and Pairwise Comparisons of Factorial MANCOVA for Statistically Significant Total Cost Variables

		Number of Coaching Sessions*					F (4, 306)	p	Partial η^2
		1	2-3	4-5	6-9	10+			
Diabetes	<i>M</i>	.08 ^{ab}	.12 ^{cd}	.11 ^{ef}	.45 ^{ace}	.48 ^{bdf}	9.08	.00	.11
	(<i>SE</i>)	(.05)	(.05)	(.08)	(.06)	(.09)			
Pharmacy	<i>M</i>	.86 ^a	.95 ^b	.77 ^c	1.17	1.50 ^{abc}	3.27	.01	.04
	(<i>SE</i>)	(.10)	(.10)	(.17)	(.13)	(.18)			

Note. *Estimated marginal means and standard errors are reported with baseline values of dependent variables and age as covariates. ^{a-f}Mean difference significant at $p < .01$.

For the second MANCOVA, four projected risk/savings dependent variables were used: acute index, chronic disease index, forecasted risk index, and projected total healthcare costs. Results revealed a non-significant difference between number of coaching sessions on the combined effects of projected risks/savings, $F(16, 1228) = 1.56$, $p = .07$; Pillai's Trace = .08; partial $\eta^2 = .02$.

The ordinal number of coaching sessions variable was included in separate negative binomial regressions with log links for the number of claims and prescriptions outcome variables. Number of coaching sessions significantly predicted number of medical claims, $\chi^2(1, N = 359) = 20.04$, $p < .01$, and prescriptions, $\chi^2(1, N = 359) = 11.36$, $p = .02$. See Table 4-8 for a summary of the statistically significant differences regarding number of coaching sessions. The results demonstrate that 10 or more coaching sessions is associated with higher numbers of medical claims compared to lower amounts of coaching sessions. Regarding number of prescriptions, those who attended 10 or more coaching sessions had an increase in number of prescriptions compared to those who attended 3 or less sessions. Similarly, those who attended 6-9 sessions, had higher amounts of prescriptions compared to those who attended only 1 session.

Table 4-8 Negative Binomial Regression Results for Significantly Different Number of Coaching Sessions

	Number of Coaching Sessions	<i>IRR</i>	<i>SE</i>	<i>p</i>	
Number of medical claims	10+	1	2.08	.18	.00
		2-3	2.09	.18	.00
		4-5	1.79	.20	.01
		6-9	1.63	.20	.02
Number of prescriptions	10+	1	1.82	.19	.00
		2-3	1.51	.18	.03
	1	6-9	.70	.18	.05

Note. Baseline values for dependent variables and age served as covariates.

Finally, an ANCOVA was run on motivation index. Results were non-significance, $F(4, 310) = 1.25, p = .29$; partial $\eta^2 = .02$.

4.5.1 Summary of Research Question 2 results

Overall, the results suggest that a greater amount of coaching is associated with increased healthcare costs, counts, and projected risks. It is also associated with an increase in the potential for acute care savings, which may indicate that those who are attending more coaching sessions are better utilizing the healthcare system. This may then explain why there are initial increases in actual and projected healthcare costs and counts up front, which provides additional support for the findings from the mediation analysis conducted for Hypothesis 2. Another plausible explanation is that those who attend more coaching sessions are failing to improve their overall health and wellbeing, thus they need to continue their involvement in the intervention. This possibility will be further explored in Chapter 5. The density of coaching sessions has largely no effect on healthcare outcomes. In addition, the results of these analyses do not suggest a clear and consistent recommendation for a specific number of coaching sessions and density that can allow participants to experience the greatest gains in healthcare outcomes. However, more coaching tends to have more impact than less coaching regardless of density.

4.6 RQ3: Types of Participant Wellness Goals

The purpose of Research Question 3 was to explore the different types of wellness goals that participants seek to address during their coaching sessions. Table 4-9 provides a sample of wellness visions representing a range of goals within each vision. Figure 4 provides a chart depicting a summary of the percentages of types of goals for the total sample. In order to provide a more complete picture of the types of clients that attend

Table 4-9 Sample Wellness Visions

Participant A <i>60 year old male,</i> <i>health risk status = 4</i>	“ride my bike on the trails in Delphi and work out at the gym to keep my A1C level below 7, tell my wife about my affairs, have a good relationship with my wife.”
Participant B <i>40 year old female,</i> <i>health risk status = 3</i>	“I want to be more organized, be under 300 lbs. I want to feel great, feel like I can accomplish anything and actually follow through with something. I would like to not battle with myself so much (internal battles).”
Participant C <i>23 year old male,</i> <i>health risk status = 1</i>	“I am 40-50 pounds lighter. I have less debt. I have at least 1 close friend, I am more clear about my relationship with [Name].”
Participant D <i>57 year old female,</i> <i>health risk status = 4</i>	“I want to be able to go for a walk for atleast a mile without everything hurting-feet,back. I want to get out of a chair without assistance. I'd like to do things that are embarassing for me now-bending over to pick up something, zipping my pants. Normal everyday things are bcoming difficult and I'm too young for that. I want to breathe easier. I want to talk about things without being teary all the time. It would be great to not feel so low about my situation and my relationships so I'm not sad all the time or down. I want to feel positive about what I'm doing. Self control and able to sat, "don't eat that. I want feel more self-confident. At school, I want to feel good versus the dumb art teacher. I have a hard time showing my family I care. Sometimes I don't want to be with anyone. I don't want to take it personally when my family doesn't want to do something with me.”
Participant E <i>37 year old male,</i> <i>health risk status = 1</i>	“I want to show my wife that I love her and respect her through my actions and words. I want to go to church and stop drinking. I want to continue to be a good dad to my children. I want to think about how my own upbringing impacted having an affair. I want to be available to help my wife with the kids. I want to grow in my communication with my wife.”
Participant F <i>53 year old female,</i> <i>health risk status = 2</i>	“To lead myself toward a healthier lifestyle both physically and mentally. Continue exercising regularly, improve my intake of fresh fruits and vegetables, and continue to work on techniques to reduce my anxiety”
Participant G <i>19 year old male,</i> <i>health risk status = 1</i>	“I want to decrease my depression and anxiety. I want to get a job, make money, and get a car. I want to be more social. I want to get help for my schizophrenia so I can move on. I want to go to college and major in business.”

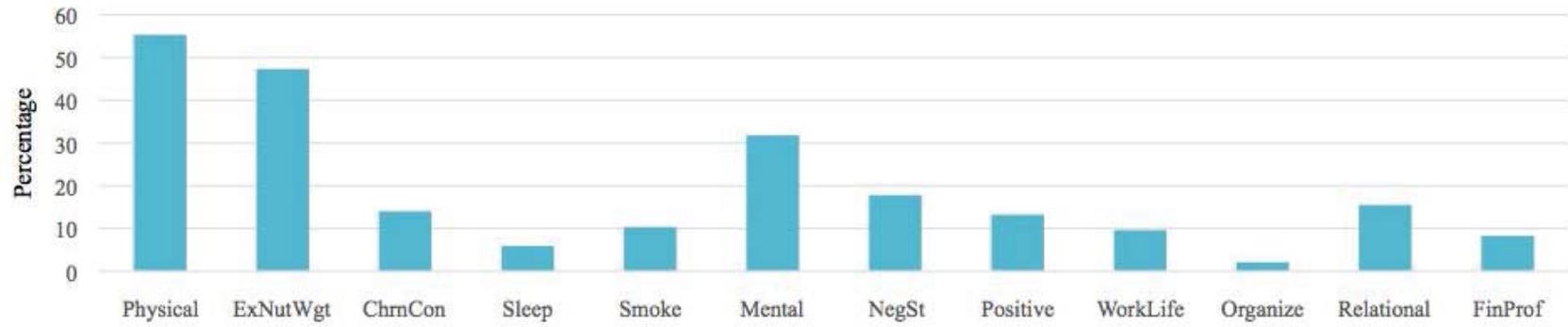


Figure 4 Total Percentage of Type of Wellness Goal (see Table 4-10 for abbreviation guide)

wellness coaching, three charts depict summaries of the percentages of different types of wellness goals broken down by key demographic information including participant sex (Figure 5), age (Figure 6), and health risk status (Figure 7). For exact percentages of each category see the table in Appendix D. Figure 8 provides a summary of the frequency of number of broad wellness goals, or broad wellness complexity, and specific wellness goals, or specific wellness complexity. Taken together, there does not appear to be any common trends regarding goal categories, with some notable exceptions. The majority of participants wanted to improve their physical health and the most common sub-category was a desire to improve their exercise, nutrition and weight. The second most common broad goal was a desire to improve mental wellbeing with wanting to reduce negative mental states (e.g., anxiety, depression, stress) as the second most common sub-category. Several participants also wanted to improve their relational wellbeing followed by improving a chronic condition. It also appears that participants frequently had more than one goal they sought to address in wellness coaching, and that these goals spanned multiple broad categories.

Taking a look at more specific goals (while ignoring the physical and mental broad categories), beyond having a desire to improve one's exercise, nutrition and weight, the biggest difference between men and women appears to lie in the mental wellbeing sub-categories. Females more so than males wanted to reduce negative mental states and increase internal positivity. Conversely, males more so than females wanted to improve their chronic conditions.

Wellness goals remained relatively equivalent across age groups, however more participants under 30 wanted to improve their relational wellbeing. It also appears that

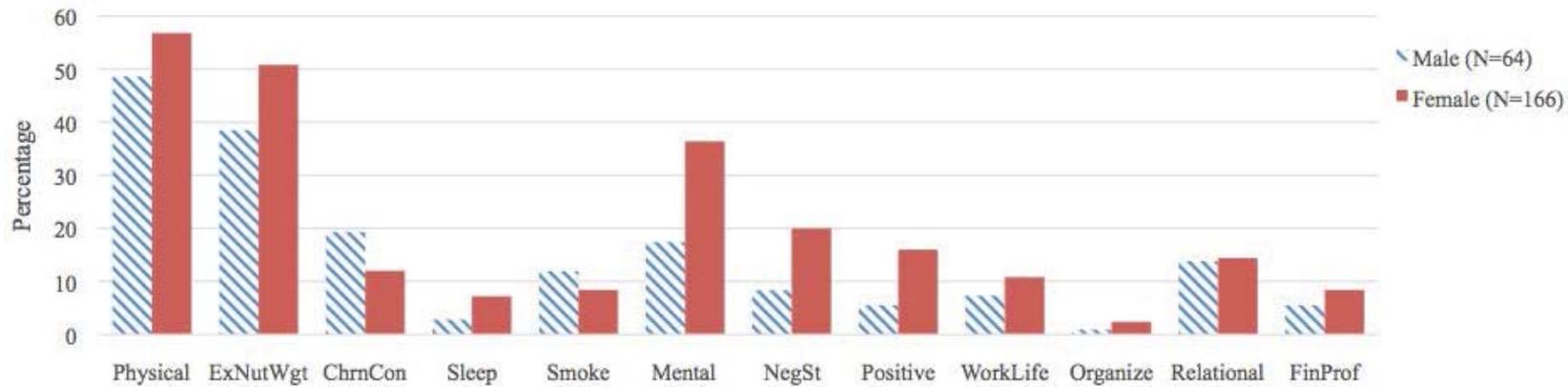


Figure 5 Percentage of Type of Wellness Goal by Sex (see Table 4-10 for abbreviation guide)

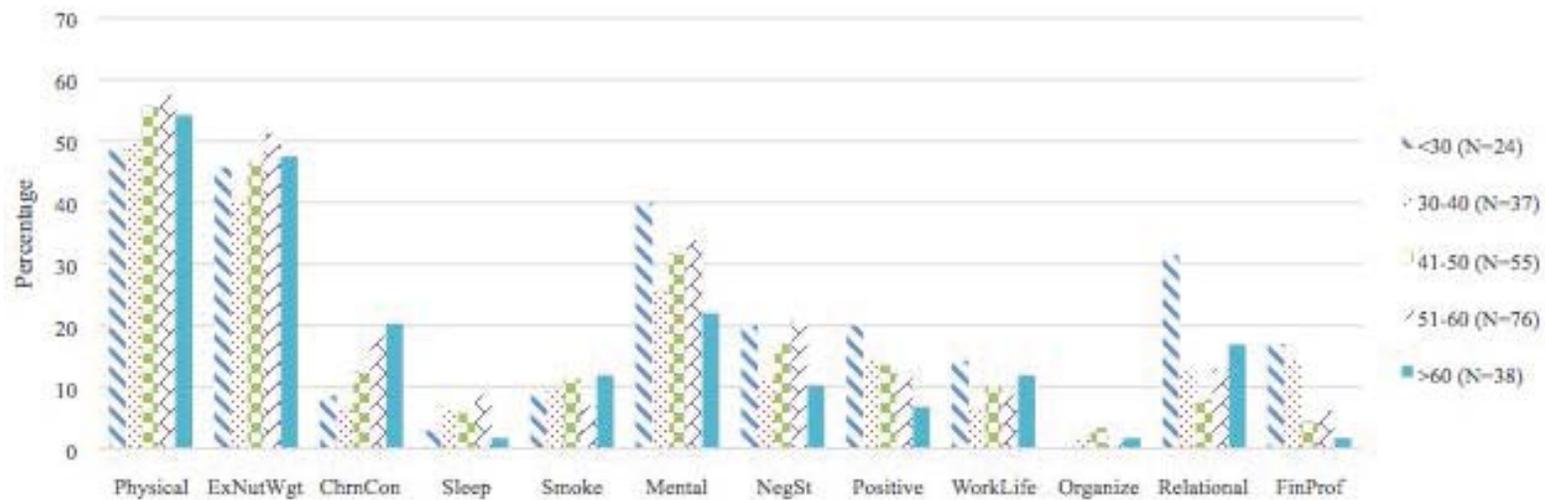


Figure 6 Percentage of Type of Wellness Goal by Age (see Table 4-10 for abbreviation guide)

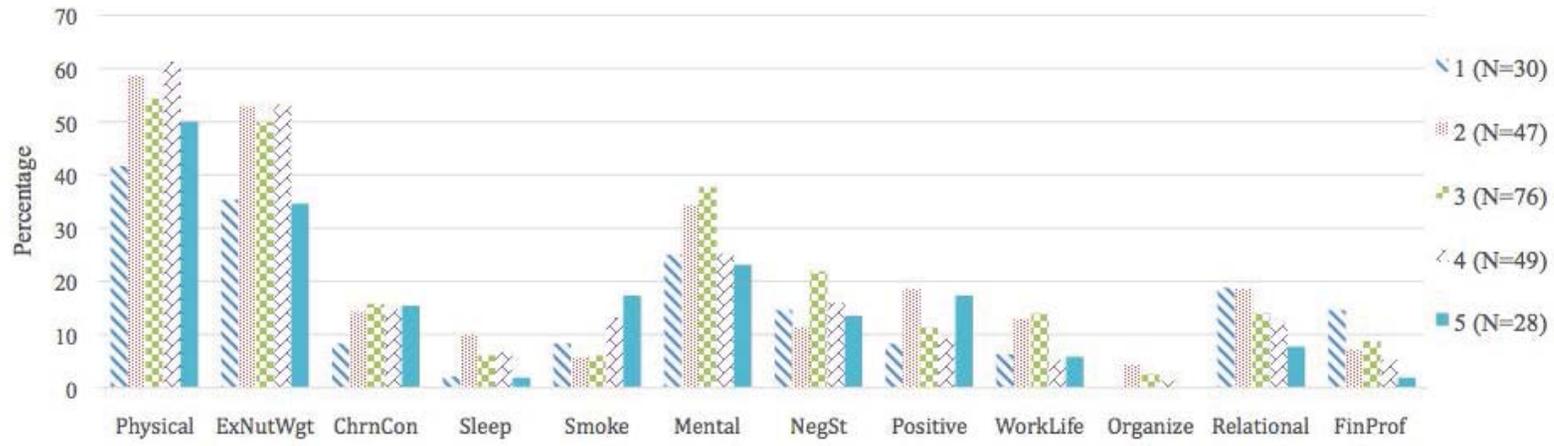


Figure 7 Percentage of Type of Wellness Goal by Health Risk Status (see Table 4-10 for abbreviation guide)

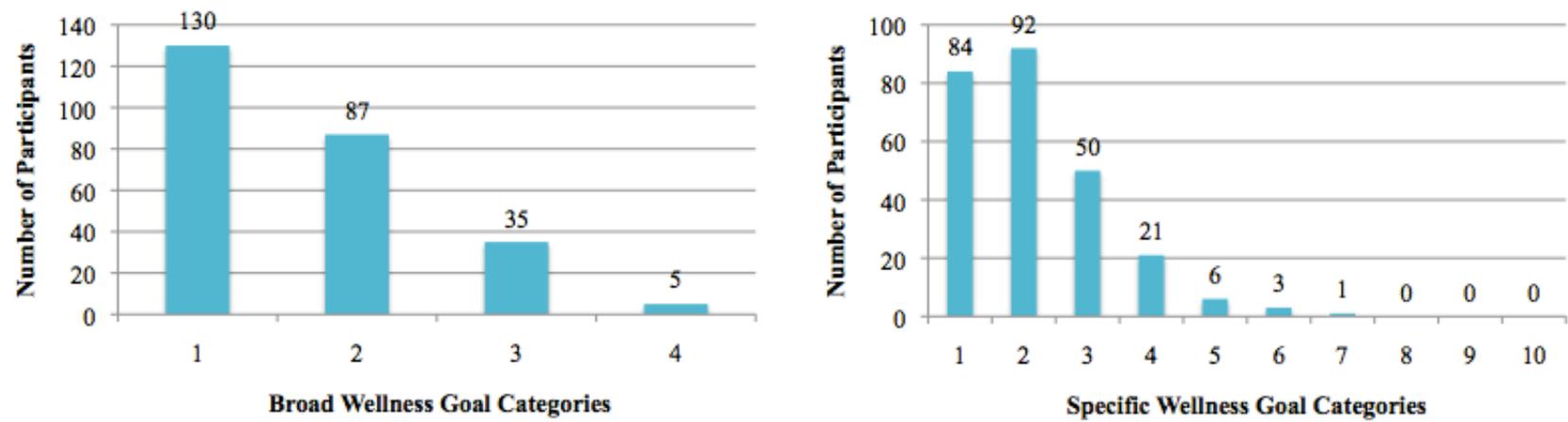


Figure 8 Number of Total Broad and Specific Wellness Goals

younger participants (less than 40) more frequently report financial and professional wellbeing goals. Finally, there were few notable differences among health risk status, with the exception that health risk 4 and 5 individuals more frequently reported wanting to quit smoking.

4.6.1 Summary of Research Question 3 results

There did not appear to be many trends regarding preferences for types of wellness goals across sex, age, and health risk status. Rather, participants report a wide variety of goals they would like to improve upon during wellness coaching and typically have more than one issue they are seeking to address. What became evident is that all types of participants had a goal of improving their exercise, nutrition, and weight. Other notable differences that occurred were females more frequently reported mental wellbeing goals, participants under 30 frequently reported wanting to improve their relational wellbeing, and participants with a health risk status of 4 and 5 reported wanting to quit smoking.

4.7 RQ4: Influence of Type of Participant Wellness Goal on Healthcare Outcomes

The purpose of Research Question 4 was to test whether the presence of a type of participant wellness goal had an effect on healthcare outcomes. Partial correlations and negative binomial regressions were run to address this question. Covariates included baseline values for all dependent variables and age because of their significant correlations with these variables. Age was not associated with total costs for preventive health and psychiatry, thus it was not included as a covariate, except when the financial and professional goal was used as the independent variables as it was correlated with these measures. Participant sex was associated with the following broad and specific

goals: mental wellbeing, chronic condition, negative mental state, and positivity. It was also related to chronic disease index, total healthcare costs, and total paid for diabetes, preventive health, and psychiatry, thus sex was controlled for in those analyses.

Results of the partial correlation analyses are presented in Table 4-10. Only the presence of a few wellness goal categories were associated with healthcare outcomes. First, those who had an exercise, nutrition and weight goal saw an increase in motivation index. In other words, they increased their potential to self-manage their healthcare, comply with instructions from healthcare providers, and pursue ways to improve their health status. Second, participants with chronic disease-related goals had the most positive associations with healthcare outcomes, specifically with total healthcare costs, total costs for diabetes and pharmacy, projected total healthcare costs, forecasted risk index, acute index and chronic disease index. More specifically, those who had a chronic disease goal had higher total and projected healthcare costs, along with an increase in the potential for savings associated with acute care and chronic disease. The broad mental wellbeing category was associated with several outcomes as well, and this appears to be largely driven by those who have a desire to reduce their negative mental state, which was positively associated with total costs for psychiatry and pharmacy, total projected healthcare costs, forecasted risk index, and acute index. Similar to those with a chronic disease goal, participants with a desire to reduce their negative mental state saw an increase in total and projected healthcare costs as well as an increase in their potential for acute care savings. There was also a positive association with the organization/de-clutter goal and total costs for psychiatry. Finally, those with the goal of quitting smoking saw a

Table 4-10 Partial Correlations for Type of Wellness Goal

	TotC ^{ab}	TotCDiab ^{ab}	TotCPrvH ^b	TotCPsy ^b	TotCRx ^a	ProjTotC ^a	FcstRisk ^a	Acute ^a	ChrnDis ^{ab}	Motive ^a
Physical	-.051	.012	-.066	-.098	-.078	-.079	-.090	-.063	.039	.085
ExNutWgt	.047	.057	.017	.005	-.002	.039	.025	.011	.046	.166*
ChrnCond ^{ab}	.161*	.203**	.019	.032	.139*	.221**	.205**	.140*	.158*	.105
Sleep	.034	.021	.070	.027	.045	.018	.024	.018	-.061	.043
Smoke	-.091	-.118	-.117	.008	-.119	-.135*	-.142*	-.070	.025	-.188**
Mental ^b	.065	.021	.103	.200**	.160*	.165*	.176**	.098	-.015	.053
NegSt ^b	.097	.003	.076	.233***	.145*	.179**	.207**	.160*	.039	-.054
Positive ^b	.002	.055	.039	.111	.070	.093	.098	.029	-.016	-.084
WorkLife	.092	.069	.082	.072	.052	.063	.066	.007	-.076	.117
Organize	.027	.050	.015	.190**	.066	.001	-.001	-.019	-.014	.041
Relational	.037	.050	-.011	.079	.081	.069	.078	.051	-.046	-.017
FinProf ^a	-.021	.047	-.091	.041	.062	.083	.059	.069	.046	.000

Note. TotC = Total healthcare costs. TotCDiab = Total costs for diabetes. TotCPrvH = Total costs for preventive health. TotCPsy = Total costs for psychiatry. TotCRx = Total costs for pharmacy. ProjTotC = Projected total healthcare costs. FcstRisk = Forecasted risk index. Acute = Acute index. ChrnDis = Chronic disease index. Motive = Motivation index. Physical = Improve physical health. ExNutWgt = Improve exercise, nutrition, and weight. ChrnCond = Improve chronic condition. Sleep = Improve sleep habits. Smoke = Quit smoking. Mental = Improve mental wellbeing. NegSt = Reduce negative mental state. Positive = Increase internal positivity. WorkLife = Improve work/life balance and quality of life. Organize = Get organize/de-clutter. Relational = Improve relational wellbeing. Fin_Prof = Improve financial and professional wellbeing. All analyses were controlled for baseline values of the dependent variable.

^aAge as covariate. ^bSex as covariate. * $p < .05$, ** $p < .01$, *** $p < .001$.

decrease in projected total healthcare costs and motivation index, which indicates that they are less likely to engage in beneficial self-management practices.

The results associated with smoking goals raised additional research questions. Based on the results, participants with a quit smoking goal reduce their projected healthcare costs, which may create the appearance that they are less of a health risk, at least in the next year. However, the decrease in motivation index suggests the contrary. Thus, it may be that smokers are less engaged and are underutilizing healthcare services, despite attending a wellness coaching intervention. To provide further evidence of the contention that smokers experienced a decrease in healthcare engagement, two additional analyses were run. The first was a bivariate correlation, which resulted in a negative association between having a smoking goal and number of coaching sessions, $r = -.121$, $p = .067$. Although this effect was non-significant, it was approaching significance and in the expected direction, suggesting that smokers attend less coaching sessions and are thus less impacted by the coaching intervention. Simple mediation analyses were then run using Hayes's (2013) PROCESS macro with 10,000 bootstrap samples. These were conducted to test whether the decrease in motivation index explained the decrease in projected total healthcare costs and forecasted risk index for those with a smoking goal. The presence of a smoking goal served as the independent variable, motivation index served as the mediator, and projected total healthcare costs and forecasted risk index served as the dependent variables. In both analyses, baseline values of the mediator and dependent variables along with age were controlled for because of their association with the outcome variables. Figures 9 and 10 present the results of the mediation analyses for projected total healthcare costs and forecasted risk index, respectively. In both cases,

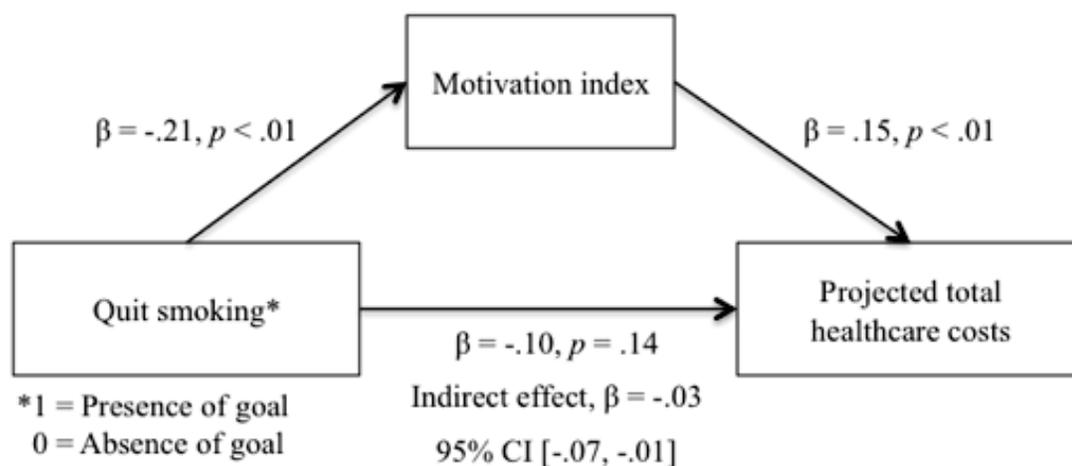


Figure 9 Mediation Analysis Predicting Motivation Index on Projected Total Healthcare Costs for Participants Wanting to Quit Smoking (baseline values of the dependent variable and age served as covariates)

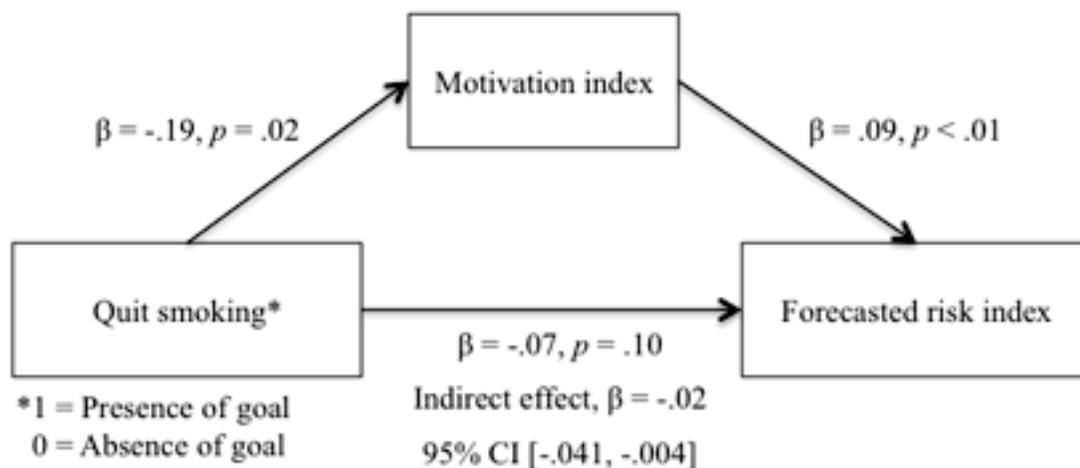


Figure 10 Mediation Analysis Predicting Motivation Index on Forecasted Risk Index for Participants Wanting to Quit Smoking (baseline values of the dependent variable and age served as covariates)

motivation index was a significant mediator between the presence of a smoking goal and projected total healthcare costs and forecasted risk index. Thus, having a goal of wanting

to quit smoking was associated with lower levels of self-management behaviors, and lowered self-management was associated with lower projected costs.

To test the effects of type of wellness goals on the number of medical claims and prescriptions, separate negative binomial regressions with log links were run. Table 4-11 displays the results of the regression analyses for all wellness goal categories on number of medical claims and prescriptions. Only two wellness goals had influences on both number of medical claims and prescriptions: chronic disease and negative mental state. More specifically, the presence of goals to improve one's chronic condition and negative mental state were associated with increased numbers of medical claims and prescriptions.

4.7.1 Summary of Research Question 4 results

Based on these results, some wellness goals do appear to be associated with healthcare outcomes. This was especially true for those who had a goal of wanting to improve their chronic disease. These participants saw an increase in healthcare costs, counts and projected risks, as well as increased engagement (i.e., acute and chronic disease index). As previously demonstrated in the mediation analyses for Hypothesis 2, this increase in engagement with the healthcare system may be the reason for the increase in initial costs and counts. Participants with a mental wellbeing goal, especially those who wanted to reduce a negative mental state and in some cases wanted to get organized, saw an increase in healthcare costs, counts and projected risks. Participants with the goal of reducing negative mental states also saw an increase in acute index, indicating increased patient engagement. There was also a significant positive association between those having an exercise, nutrition and weight goal and motivation index. Conversely, participants with a goal of wanting to quit smoking saw a decrease in projected healthcare

Table 4-11 Results of Negative Binomial Regressions for Type of Wellness Goal on Number of Medical Claims and Prescriptions

	<i>IRR</i>	SE	χ^2	<i>p</i>
Physical				
Number of medical claims	0.880	0.199	0.408	0.523
Number of prescriptions	1.185	0.206	0.680	0.410
Exercise, nutrition, weight				
Number of medical claims	0.822	0.163	1.448	0.229
Number of prescriptions	1.018	0.174	0.011	0.915
Chronic condition				
Number of medical claims	1.686	0.167	9.724	.002**
Number of prescriptions	1.745	0.173	10.401	.001**
Sleep				
Number of medical claims	1.045	0.240	0.034	0.853
Number of prescriptions	0.959	0.248	0.029	0.864
Smoke				
Number of medical claims	0.980	0.180	0.010	0.920
Number of prescriptions	1.259	0.209	1.218	0.270
Mental				
Number of medical claims	1.155	0.147	0.956	0.328
Number of prescriptions	1.183	0.150	1.261	0.261
Negative state				
Number of medical claims	1.449	0.155	5.683	.017*
Number of prescriptions	1.484	0.162	5.930	.015*
Positive				
Number of medical claims	1.011	0.173	0.004	0.947
Number of prescriptions	0.890	0.181	0.413	0.520
Work/life & quality of life				
Number of medical claims	1.008	0.192	0.002	0.965
Number of prescriptions	1.068	0.198	0.111	0.739
Organize/de-clutter				
Number of medical claims	1.050	0.394	0.016	0.900
Number of prescriptions	1.451	0.401	0.864	0.353
Relational				
Number of medical claims	1.153	0.174	0.676	0.411
Number of prescriptions	1.121	0.180	0.401	0.527
Financial & professional				
Number of medical claims	0.911	0.218	0.184	0.668
Number of prescriptions	0.757	0.227	1.502	0.220

Note. *df* = 1. *N* = 230. **p* < .05, ***p* < .01

costs and motivation index. Further analyses revealed that people trying to quit smoking attended less coaching sessions, however this result did not reach conventional levels of

statistical significance. The mediation analysis confirmed that the decrease in motivation explained the decrease in projected healthcare costs.

4.8 RQ5: Effects of Wellness Complexity on Healthcare Outcomes

Research Question 5 asked whether participant wellness complexity would have an influence on healthcare outcomes. To test this question, partial correlations and negative binomial regressions were run. Covariates included baseline values for all dependent variables and age, except in analyses involving total costs for preventive health and psychiatry because they were not related. For the partial correlation analyses, broad and specific wellness complexity served as independent variables. Participant sex was related to broad but not specific wellness complexity, thus it was included as a covariate for all of its analyses. Sex was also included as a covariate for analyses involving specific wellness complexity and chronic disease index, total healthcare costs, and total paid for diabetes, preventive health, and psychiatry because it was correlated with these dependent variables.

Results of the partial correlation analyses are presented in Table 4-12. It appears that broad and specific wellness complexity are positively associated with total costs for pharmacy and psychiatry as well as projected total healthcare costs and forecasted risk index. Specific wellness complexity is also positively associated with total healthcare costs, total costs for diabetes, and acute index. In other words, having more wellness goals is associated with increased total and projected healthcare costs and an increase in one's capacity to save on acute care costs.

To test the effects of wellness complexity on the number of medical claims and prescriptions, separate negative binomial regressions with log links were run. Broad

Table 4-12 Partial Correlations for Wellness Complexity

	Broad wellness complexity ^b	Specific wellness complexity
Total healthcare costs ^{ab}	.029	.132*
Total costs for diabetes ^{ab}	.065	.141*
Total costs for preventive health ^b	-.003	.035
Total costs for psychiatry ^b	.135*	.238***
Total costs for pharmacy ^a	.144*	.153*
Projected total healthcare costs ^a	.144*	.209**
Forecasted risk index ^a	.142*	.204**
Acute index ^a	.091	.138*
Chronic disease index ^{ab}	.002	.045
Motivation index ^a	.069	.029

Note. All analyses were controlled for baseline values of the dependent variable. ^aAge as covariate. ^bSex as covariate. * $p < .05$, ** $p < .01$, *** $p < .001$.

wellness complexity was not a significant predictor of number of medical claims, $\chi^2(1, N = 230) = .95, p = .33$, or prescriptions, $\chi^2(1, N = 230) = .53, p = .47$. Conversely, specific wellness complexity predicted both number of medical claims, $\chi^2(1, N = 230) = 4.75, p = .03$, and prescriptions, $\chi^2(1, N = 230) = 6.10, p = .01$. After controlling for age and baseline values, there was a positive effect for number of medical claims ($IRR = 1.12, SE = .05, p = .03$) and number of prescriptions ($IRR = 1.15, SE = .06, p = .01$). Thus, an increase in specific wellness complexity led to an increase in both number of medical claims and prescriptions.

4.8.1 Summary of Research Question 5 results

Participants who identified multiple aspects of their health and wellness that they would like to improve during a coaching intervention saw an increase in healthcare costs, higher projected healthcare costs, and frequency of healthcare usage. There was also a positive relationship with specific wellness complexity and acute index, suggesting that

the intervention's impact on patient engagement increases as participants' wellness complexity increases.

4.9 RQ6: Coaching by Participant Sex Interaction on Healthcare Outcomes

Research Question 6 asked whether participant sex would interact with coaching participation to influence healthcare outcomes. To answer this question, results from the factorial MANCOVAs, negative binomial regressions, and ANCOVA used in Hypothesis 1 were relied on. For the first MANCOVA, which included the five healthcare cost outcome variables, the coaching*sex interaction was non-significant, $F(5, 1234) = 1.495$, $p = .188$; Pillai's Trace = .006; partial $\eta^2 = .006$. The same results occurred for the second MANCOVA, which included the four projected risks/savings outcome variables, $F(4, 1236) = .881$, $p = .475$; Pillai's Trace = .003; partial $\eta^2 = .003$.

The interaction between coaching and sex was also non-significant for the negative binomial regression on number of medical claims, $\chi^2(1, N = 1264) = .527$, $p = .468$, and prescriptions, $\chi^2(1, N = 1264) = .408$, $p = .523$.

There was a statistically significant interaction effect between coaching and sex on motivation index, according to the results of the ANCOVA, $F(1, 1242) = 5.490$, $p = .019$; partial $\eta^2 = .004$. One-way ANCOVAs controlling for baseline motivation index and age were conducted to analyze the simple effects. There was a significant difference between males in the coached versus non-coached group, $F(1, 362) = 7.939$, $p = .005$; partial $\eta^2 = .021$. The difference between females was non-significant, $F(1, 894) = 1.374$, $p = .242$; partial $\eta^2 = .002$. Mean scores indicate that males in the coached group had slightly higher levels of motivation index, ($M = 1.18$, $SE = .06$) compared to those in

the non-coached group, ($M = 1.00$, $SE = .03$). In other words, coached males were more likely to increase their self-management behaviors compared to non-coached males.

4.9.1 Summary of Research Question 6 results

Taken together, these analyses suggest that there is largely no difference between men and women in terms of their healthcare outcomes following a coaching intervention, with one exception. Results suggest that males experience a slight increase in motivation to increase their self-management behaviors compared to non-coached males, while females remain the same across both conditions.

4.10 RQ7: Coaching by Health Risk Status Interaction on Healthcare Outcomes

The purpose of Research Question 7 was to ascertain whether participant health risk status interacted with coaching to influence healthcare outcomes. The results from the factorial MANCOVAs, negative binomial regressions, and ANCOVA used in Hypothesis 1 were analyzed to answer this question. The first MANCOVA with the five healthcare cost outcome variables indicated a non-significant coaching*risk interaction, $F(20, 4948) = 1.372$, $p = .124$; Pillai's Trace = .022; partial $\eta^2 = .006$.

The interaction effects for the second MANCOVA containing the four projected risks/savings outcome variables proved to be significant, $F(16, 4956) = 2.086$, $p = .007$; Pillai's Trace = .027; partial $\eta^2 = .007$. Results of the dependent variables were considered separately using a Bonferroni adjusted alpha level of .013. None of the dependent variables reached statistical significance, however acute index approached significance, $F(4, 1239) = 2.515$, $p = .040$; partial $\eta^2 = .008$. Examination of the means revealed that participants in the coaching intervention saw greater improvements to their acute index (i.e., their potential for acute care savings) when they were at lower risk

levels, but this result should be interpreted with caution given its failure to reach statistical significance using a more conservative alpha level.

The interaction between coaching and health risk status was non-significant for the negative binomial regressions on number of medical claims, $\chi^2 (1, N = 1264) = 6.999$, $p = .136$, and prescriptions, $\chi^2 (1, N = 1264) = 4.798$, $p = .309$.

Finally, the results of the ANCOVA testing the interaction effects of coaching and health risk status on motivation index were non-significant, $F (4, 1242) = 1.671$, $p = .154$; partial $\eta^2 = .005$.

4.10.1 Summary of Research Question 7 results

The results as a whole suggest that a person's health risk status does not have an effect on healthcare outcomes following participation in a coaching intervention. Evidence might suggest that those at lower risk may see an improvement to their acute index, however this result failed to reach statistical significance using a more conservative alpha level. It appears that coaching largely impacts participants equally, regardless of their health risk status.

4.11 Overall Summary

In this chapter, the effects of a wellness coaching intervention along with intervention variations were analyzed. Participation in a coaching intervention along with variation in coaching amount does have an impact on healthcare outcomes, such that there is typically a positive association with healthcare costs, counts, and projected costs, thus supporting Hypothesis 1. Coached participants saw an increase in patient engagement behaviors, which appears to mediate the relationship between coaching and healthcare costs and utilization, which supported Hypothesis 2. Moreover, results suggest

that over time, coached participants' costs will decrease, which answered Research Question 1. Although an ideal amount of coaching and density cannot be recommended, it appears that attending more sessions is associated with a greater impact on healthcare outcomes, thus answering Research Question 2. In order to answer Research Question 3, participant wellness goals were explored, which provided a richer description of this intervention. The type of goals (Research Question 4), wellness complexity (Research Question 5), and participant sex (Research Question 6) seems to have an effect on healthcare outcomes, while the influence of participants' health risk status (Research Question 7) mostly remained non-significant. The theoretical, practical and methodological implications of these results will be discussed in the next chapter.

CHAPTER 5. DISCUSSION

The purpose of this dissertation was to provide an in-depth exploration of wellness coaching and its effects on healthcare outcomes through an examination of coaching and client features. The results suggest that coaching is associated with increased levels of healthcare costs and utilization, which is likely mediated by an increase in patient engagement and over time, these costs tend to decline. In addition, coaching may be targeted to specific clients based on type of wellness goals, wellness complexity and participant sex. This chapter provides a summary of the research findings, as well as a discussion of the theoretical, practical, and methodological implications of the results. Finally, limitations of the study and areas for future research are presented.

5.1 Summary of Study Findings

5.1.1 Impact on healthcare outcomes

One major goal of this research project was to examine whether a wellness coaching intervention and its variations, impacts healthcare outcomes. The broad term “healthcare outcomes” was used to represent healthcare costs, risks and behaviors that are commonly depicted in medical claims data, rather than specifically referring to health status. A group of specific healthcare outcomes were highlighted that served as indicators of improved patient engagement: total costs for preventive health, acute index, chronic

index and motivation index. These positively correlated variables are calculated by MEDai to represent total costs associated with the utilization of preventive health services (e.g., screenings, annual check-ups), the potential for acute care savings, the potential for chronic disease care savings, and one's motivation to self-manage their healthcare, respectively. While the remaining healthcare outcome variables (e.g., total costs for diabetes, total costs for pharmacy, etc.) could indicate an increase in patient engagement, they could also represent increased costs associated with unhealthy behaviors. Therefore, the four measures of patient engagement described above more clearly represent improved utilization of the healthcare system.

Results suggest that participation in a wellness coaching intervention does have an effect on current and projected healthcare costs and behaviors. A closer examination of this effect reveals that wellness coaching participation and its influence on healthcare outcomes is mediated by patient engagement indices. In other words, coaching is associated with higher levels of patient engagement, which is related to higher amounts of healthcare costs and utilization. This is in line with previous work demonstrating that highly engaged patients are more likely to adhere to medical regimens and get preventive care (e.g., Becker & Roblin, 2007; Hibbard, Mahoney, Stock, & Tusler, 2007). When patients increase their engagement with the healthcare system and in turn increase healthcare utilization, costs tend to go up initially (Cohen, Neumann, & Weinstein, 2008). The next question is whether costs will eventually start to decrease following the increased use of preventive services. The project results suggest that over time, the initial increase in healthcare spending will eventually start to decline. One alternative explanation for this result is that as more time passes since the intervention, participants

may be more likely to reduce their patient engagement with the healthcare system, which would be reflected in lower total and projected costs. Correlational analyses revealed, however, that post-treatment distance was largely unrelated to indicators of patient engagement. In other words, evidence does not suggest that coached participants become less engaged over time. Thus, a better explanation is that costs are declining because of the positive effects that wellness coaching has on patient engagement with the healthcare system. The results are also in line with studies demonstrating the improved return on investments for wellness programs over time (Aldana, 2001; Aldana et al., 2005, Berwick et al., 2008; Merrill et al., 2011).

In the current sample, the average distance from last coaching date to post-treatment measurement was one year, and the maximum distance was approximately 2.5 years. Researchers recommend longer durations in order to start seeing improvements in total costs spent (Aldana, 2001; Aldana et al., 2005, Berwick et al., 2008; Merrill et al., 2011), thus data collected over additional and longer periods of time is necessary in order to fully establish this effect while using more formal cost trend analysis techniques.

In addition, results suggest that greater numbers of coaching sessions have a stronger impact on healthcare outcomes (i.e., total costs for diabetes, psychiatry and pharmacy, number of medical claims and prescriptions, projected healthcare costs, forecasted risk index, and acute index). In other words, increased coaching may be associated with higher levels of patient engagement, which according to the results of the mediation analysis, is associated with higher levels of total and projected healthcare costs and utilization. Of course, this increase in coaching sessions could be a function of clients failing to improve their health and wellbeing, thus they feel inclined to continue

participation in the intervention. A more likely explanation is that it may be beneficial for clients to attend multiple coaching sessions in order to experience a greater impact from the intervention. This makes sense given that wellness coaching is goal-driven, and goal setting is most effective when participants are held accountable for and track their progress towards attaining those goals (Grant, 2006). Interviews with wellness coaches support this claim. They suggest that the increase in accountability is what motivates clients to ensure they have met their goals for the week. The more coaching sessions a client attends, the more opportunities they have to track progress towards goal attainment. This notion of the benefits of accountability may provide a unique opportunity to extend confirmation theory, which will be explored in the theoretical implications section. In addition, beyond recommending a greater number of coaching sessions, there does not appear to be an ideal dosage that would maximize healthcare outcomes. Finally, coaching density did not greatly affect healthcare outcomes.

5.1.2 Types of wellness goals

Another goal of this project was to gain a better understanding of the types of issues that are discussed during wellness coaching interventions. Weight management through improved exercise and nutrition was the most common wellness goal. Participants frequently stated their desire to want to be more active, improve their eating habits, get back into shape, have more energy and lose weight. This is not surprising given that typically over 60% of U.S. adults have a desire to lose weight (Muennig, Jia, Lee, & Lubetkin, 2008; Yaemsiri, Slining, & Agarwal, 2011). The next most common goals discussed during coaching sessions are to deal with stress, anxiety, and depression and to cope with issues from the past. People also wanted to improve the management of

their chronic illness by decreasing the amount of pain they were in, reducing their number of medications, and getting their biomarkers under control (e.g., HbA1c, blood pressure, cholesterol). Participants also wanted to repair/improve current relationships with significant others, children and parents, or establish new relationships by making more friends and being more social. These are just a few of the many goals indicated by participants. Taken together, while exercise, nutrition and weight goals appear to be the most common wellness issues that participants seek to address across sex, age, and health risk status, there are a myriad of other goals that participants seek to attain, which they consider to be important aspects of their health and wellbeing.

5.1.3 Intervention targeting

The last major goal of this project was to test whether wellness coaching interventions could be targeted to specific sub-groups of the population. The first factor for which this intervention could be targeted is the type of wellness issue participants seek to address. As expected, those with an exercise, nutrition and weight goal saw increases in their levels of engagement with the healthcare system. Specifically, they saw an increase in motivation index, which represents participants' capacity to self-manage their healthcare, comply with instructions from healthcare providers, and pursue ways to improve their health status. This is in line with research from Dailey and colleagues that consistently shows the benefits of confirming messages for recipients who have weight management goals (Dailey, McCracken, et al., 2011; Dailey, Richards, et al., 2010; Dailey, Romo, et al., 2010; Dailey, Romo, & et al., 2011; Dailey et al., 2014).

Wellness coaching is also well suited for people who are trying to improve the management of chronic diseases. Participants with a chronic disease management goal

saw the greatest benefits in terms of their increased utilization of the healthcare system and improved engagement behaviors across multiple dependent variables. Experimental and quasi-experimental studies on chronic disease interventions using similar techniques (e.g., goal setting, motivational interviewing, social support) frequently show increased levels of self-efficacy and patient empowerment following an intervention (Linden et al., 2010; Walters et al., 2013; Wierdsma, van Zuilen, & van der Bijl, 2011; Young et al., 2014). Thus, the current findings present another type of intervention that can be successfully applied as a means to increase the self-management of those with chronic diseases.

Study results indicate that participants with mental wellbeing goals, particularly those wanting to manage their depression, anxiety, and stress, cope with past issues, and get organized, also see increases in healthcare utilization. Those with the goal of wanting to improve their negative mental state also saw an increase in patient engagement. This is especially promising considering that those with mental disorders are typically less adherent to treatment plans (Ciechanowski, Katon, & Russo, 2000; DiMatteo, Lepper, & Croghan, 2000; Lingam & Scott, 2002; Mitchell & Selmes, 2007a; Mitchell & Selmes, 2007b). The fact that participants saw an increase in costs for psychiatry and prescriptions may suggest that coaching is encouraging clients to continue attending counseling appointments and taking their prescribed medications.

In the current study, there was not enough evidence to suggest that coaching was associated with beneficial outcomes for participants trying to quit smoking. Those with this goal saw a decrease in projected healthcare costs and motivation, suggesting less engagement with the healthcare system. Further analyses confirmed this supposition by

demonstrating a decrease in attended coaching sessions, although this result did not reach conventional levels of statistical significance. Additional evidence provided by the mediation analysis revealed that participants' decrease in projected total healthcare costs and forecasted risk was explained by their lowered levels of motivation. In other words, smokers tend to exhibit lower self-management behaviors, which then reduces their projected healthcare costs because of a lack of healthcare utilization. This is in line with previous research that consistently shows smokers are less adherent to treatment plans and medication usage and infrequently use preventive services (Aggarwal & Mosca, 2010; Laforest et al., 2010; Lemon et al., 2001; Pearson et al., 2009). Thus, based on the current sample, smokers appear to be a particularly difficult group to affect change in, suggesting that coaches who are dealing with smokers may need to augment their strategies with additional techniques beyond what has been shown to be effective for other goals.

Wellness coaching is also a useful intervention for those with higher wellness complexity. Participants who had multiple issues they wished to address during coaching saw an increase in healthcare engagement. One possible explanation for this finding may lie in a comparison of traditional physician visits to wellness coaching sessions. Physicians appear to be less able to help patients achieve lifestyle related behavior changes (Brown et al., 2003; Frates et al., 2011; Huffman, 2007). According to results from the National Ambulatory Medical Care Survey (Hing, Cherry, & Woodwell, 2005), general and family practitioners spend approximately 18.7 minutes with their patients per visit. Similarly, a study conducted with elderly patients who are known to have complex comorbidities, found that median routine office visit length was 15.7 minutes. A median of 6 topics were covered with approximately 5 minutes spent on the longest topic and 1.1

minutes spent on the remaining issues (Tai-Seale, McGuire, & Zhang, 2007).

Unfortunately, it takes considerable time to make behavioral changes. One study found that the time it takes to adopt a new healthy behavior ranges from 18 to 254 days, with a median time of 66 days (Lally, van Jaarsveld, Potts, & Wardle, 2010). Discussing a health goal for 5 minutes certainly may not be enough to motivate behavior change. Moreover, because of the limited time physicians have with patients, they likely focus on more pressing health issues (e.g., diet, exercise, medication adherence, etc.) rather than trying to identify other areas of wellness where clients feel they can actually make progress. This may then be negatively impacting feelings of self-efficacy to make any behavioral changes. As such, wellness coaching appears to be an important complement to traditional healthcare practices. Coaches try to boost clients' confidence in their ability to achieve their goals through a demonstration of early successes (Moore & Tschannen-Moran, 2010); these successes then increase one's self-efficacy to achieve other goals down the road (Bandura, 1998). Interviews with wellness coaches confirm that they rely heavily on this technique. Some coaches stated that their most difficult clients are the ones with multiple health and wellness issues. In order to help these clients, they try to find the one area that clients are most willing to change, regardless of what that change is. These early successes help give clients the confidence that they can succeed in other areas of their life, which may best explain why those with higher wellness complexity fare well during this intervention.

This project also sought to test whether wellness coaching was more effective for men or women. Results across multiple dependent variables found non-significant differences between males and females regarding healthcare outcomes. The one

exception was in the case of motivation. Men who participated in a wellness coaching intervention compared to those who did not, appear to experience a slight increase in their levels of motivation while women's levels remained the same. An explanation for this difference may be found in gender differences that exist between men and women's help seeking behavior. In a review of the psychology of men's help seeking behavior, Mansfield, Addis and Mahalik (2003) state that men consistently underutilize healthcare services, underreport physical and mental problems, and thus are less likely to seek help for these issues. This may be due to masculine gender socialization, which creates the impression that men should be self-reliant, should avoid emotional expression, and should avoid appearing weak and vulnerable. Social constructionist theory also dictates that men may deny pain and discomfort to minimize the problem in an effort to appear stronger. Social psychological theory suggests that men will not seek help if they believe it is stigmatizing to do so. The authors suggest that certain strategies can be implemented to overcome some of these issues. They state that once men decide to seek help, an intervention that relies on motivational interviewing techniques, a technique used in wellness coaching, may produce more beneficial results because it helps men explore and cope with the ambiguities of whether they should change or not (Miller & Rollnick, 2002). Thus, motivational interviewing through a wellness coaching intervention may be most appealing to men as a way to help them increase their levels of patient engagement.

The last factor that was tested as a possibility for targeting was health risk status. The current study did not provide enough evidence to suggest that wellness coaching could be targeted based on participant risk level. Some results indicated that lower risk participants may experience greater patient engagement, which was depicted in an

increase in acute index, however this result failed to reach statistical significance using a Bonferroni alpha adjusted level. Additional evidence is needed to explore whether this finding can be replicated.

5.2 Theoretical Implications

In this project, confirmation theory was used as a framework to explain the communicative mechanisms that affect behavior change in a wellness coaching intervention. By applying this interpersonal communication theory to a health intervention context, it provided an opportunity to demonstrate its generalizability. Dailey and colleagues consistently show that receiving confirming messages from close others including friends, romantic partners, parents and the like, lead to improved weight management outcomes (Dailey, McCracken, et al., 2011; Dailey, Richards, et al., 2010; Dailey, Romo, et al., 2010; Dailey, Romo, et al., 2011; Dailey et al., 2014). Yet it was unclear whether these successes would exist when messages were delivered within a professional relationship. After all, the coach-client dyad does not possess features characteristic of close relationships such as having a long-term relationship and higher levels of intimacy. This closeness may help mitigate perceptions of threat that might follow from the reception of challenge messages (Brown & Levinson, 1987). Despite these differences, results indicate that the tenets of confirmation theory can be successfully applied to a coach-client dyad. Moreover, Dailey and colleagues discovered that participants with weight management goals saw improvements in self-reported exercise and diet behaviors. The results of this project demonstrate that these effects not only translate to self-report data, but more objective measures of health outcomes – medical claims data – thus strengthening the validity of confirmation theory’s predictions.

In sum, this project further supported the results of Dailey and colleagues' previous studies using a different relational dyad and health outcome metrics.

It was not surprising to see an increase in patient engagement following a coaching intervention for those with weight management goals as confirmation theory researchers have consistently established this effect. Another purpose of this study was to test whether a communicative intervention is effective at helping people attain other health and wellness goals. Results reveal that participants who wish to improve their chronic health condition and mental wellbeing, especially those trying to reduce negative mental states, also saw benefits during a wellness coaching intervention. These results suggest that messages constructed based on the tenets of confirmation theory can be used to help others with their chronic disease and mental wellbeing goals, further demonstrating the utility of this theory. Smokers were the most notable exception to the general pattern of findings. It appears that a communicative intervention alone may not be enough to help smokers quit.

This project also addresses the broader topic of communication's impact on healthcare outcomes. Street and colleagues have posited that communication ought not be considered, by and large, a direct cause of major health outcomes, rather, communication impacts a wide variety of psychosocial and behavioral outcomes that, in turn, more directly impact health (Street, Makoul, Arora, & Epstein, 2009). More specifically, they suggest that communication may affect health outcomes through indirect proximal (e.g., satisfaction, motivation) and intermediate (e.g., social support, self-care skills) pathways. They have called for additional research to provide evidence for this contention. This project lends support for their proposed model of indirect pathways from communication

to health outcomes in that it demonstrates that communication, through a wellness coaching intervention, is associated with increased patient engagement, which is positively related to health outcomes. Moreover, coaching's impact on healthcare outcomes resulted in small effect sizes. These small effects may be due in part to coaching communication's larger impact on psychosocial and behavioral factors, which in turn might be affecting healthcare outcomes. Dailey and colleagues have implied that this relationship exists, but have not formally tested whether improvements to self-efficacy and self-worth mediate the relationship between confirming messages and weight management outcomes (Dailey, Richards et al., 2010; Dailey, Romo, et al., 2011). More research is necessary to test this hypothesis.

The results of this study suggest one area where confirmation theory can be extended within the realm of close relationships. As previously discussed, an increase in number of attended coaching sessions was associated with an increase in healthcare utilization and patient engagement, which may be due to the fact that more coaching provides more opportunities to hold participants accountable for their wellness goals. This notion of accountability has been somewhat overlooked in the previous research on confirming messages within close relationships. Dailey and colleagues have controlled for the frequency of weight management communication rather than having it serve as a factor in their research (Dailey, McCracken et al., 2011; Dailey, Richards et al., 2010; Dailey, Romo, et al., 2011). Furthermore, they operationalized frequency by asking how often participants talked about weight/body issues in the past 30 days (e.g., Dailey, Richards, et al. 2010). This does not allow for an assessment of how frequently *challenge* messages, which involves accountability questions, were specifically communicated by

their partners. With that being said, it is unclear how the role of varying levels of accountability affects health outcomes for participants receiving confirming messages within close relationships.

Moreover, while close others may communicate their broad goals to their partner (e.g., I want to lose weight), it is not clear whether they are communicating their *specific* goals to their partners (e.g., I want to go to the gym 3 times a week). This makes it difficult for close others to hold their partners accountable if they do not know the specific goals they are trying to attain. Coaches, on the other hand, begin the intervention by identifying clients' long-term and short-term wellness goals and are required to ask about the progress of each goal during subsequent coaching sessions (Moore & Tschannen-Moran, 2010). As such, accountability and tracking client progress is an inherent part of the coach-client interaction. It could be that challenge messages, which include accountability questions, directed toward close others might be more effective if partners clearly communicate their short-term weight management goals. In this way, close others can more frequently assess their partners' progress in attaining those specific goals, which appears to be beneficial in coach-client interactions.

Of course, it is unclear if frequency would have the same effect in close relationships as it does in a wellness coaching context. Dailey, Romo, et al. (2011) found that an increase in weight management conversations was associated with more conflict in romantic relationships. It is plausible that an increase in discussions about weight management initiated by a partner can be perceived as nagging, which may not be beneficial to close others' weight management goals. Perhaps without formally requesting that close others hold partners accountable for their wellness goals, an increase

in communication may not be advantageous. In comparison, clients purposely seek out wellness coaching, and in this way, are implicitly asking to be held accountable. Thus, when coaches ask clients how much progress they have made on their goals, it is perceived as being normative and helpful rather than potentially intrusive. Clearly, more research is needed to explore the role that accountability plays in both professional and personal relationships. In turn, this will allow for a possible extension of confirmation theory.

5.3 Practical Implications

Perhaps the most substantial practical implication this study provides is in regards to an assessment of its possibility for a return on investment for wellness coaching interventions. Results demonstrate that there is an initial increase in costs due to an increase in patient engagement, however a decline in costs may start to manifest with increased time. Previous research shows that wellness programs can be a cost effective strategy to save money (Bodenheimer et al., 2002; Lorig et al., 2001; Lorig et al., 1999), but these programs usually take more than 3 years to see a return on investment (Chapman, 2012; Merrill et al., 2011; Naydeck et al., 2008). Additional research lends support to the notion that highly activated or engaged patients have lowered healthcare costs (Hibbard, Greene, & Overton, 2013). The results of the current study provide additional evidence that wellness coaching is an effective and most likely cost-saving intervention. A thorough cost trend analysis that compares the cost to implement the intervention and healthcare savings over a longer period of time should be conducted to provide further support for these preliminary findings in the case of wellness coaching specifically.

Another practical implication of this study is that it provides a richer description of the types of issues clients seek to address. The current wellness coaching literature only highlights five broad issues that clients may discuss with their coaches: exercise, nutrition, weight, stress and life satisfaction (Moore & Tschannen-Moran, 2010). It appears that these broad categories are much more varied, especially regarding life satisfaction. Knowing that clients frequently seek to address goals such as dealing with depression, improving relationships, getting organized, improving finances, and improving the management of their chronic condition can help bolster their training program by addressing these varied topics. Moreover, coaches can preemptively seek additional certifications in some of these areas in order to be more effective at interacting with these types of clients and providing advice when it is solicited.

A final implication is the possible increase in benefits for men taking part in a wellness coaching intervention. It appears that wellness coaching can help men improve their self-management behavior, which should eventually lead to improvements in healthcare costs and utilization. The difficulty still lies in getting men to seek out wellness coaching services. This may be overcome in the way that wellness coaching is presented to them. Research conducted by Robertson and Fitzgerald (1992) found that men responded more favorably to psychotherapy advertisements that emphasized the goal-directed and problem-focused versus emotional nature of therapy. Given that wellness coaching is highly goal-driven, emphasizing this aspect of coaching through advertisements of the service may encourage more males to enroll in this intervention. Participation in wellness coaching may then lead to a greater improvement in their self-management behaviors.

5.4 Methodological Implications

The statistical techniques used in this project allow for important methodological implications. A contribution of this project was to explore the possibility of using a propensity scoring method in interpersonal and health communication research. In this project, those who participated in a wellness coaching intervention were matched with non-participants on key characteristics such as age, sex, healthcare costs, and health risk factors, in order to create a meaningful comparison group. Although participants could not be matched perfectly on all variables, results of the propensity scored matches indicated large improvement to most key factors, thus creating a similar control group for which intervention effects could be assessed.

The use of propensity scoring in this project and in others has proven to be a useful statistical tool for analyzing quasi-experimental data. This methodological design is especially useful when it is too costly and difficult to establish a true control sample, especially when researchers intend to track longitudinal effects. This is also a useful method when it would be considered unethical to randomly assign some participants to the control group and in turn withhold potentially beneficial treatments from them (Linden, Adams, & Roberts, 2005). In sum, interpersonal and health communication researchers who prefer to conduct observational studies would benefit from the use of propensity scoring to create comparable control groups when such data is available. This may be especially advantageous for researchers conducting large-scale health campaign studies. In addition, communication researchers who recognize the existence of such techniques may find other opportunities to explore communication-related concepts within existing datasets.

5.5 Limitations and Future Directions

This project had some limitations that warrant discussion. First, it was not a true experimental design given that participants were not randomly assigned to conditions. Rather, participants self-selected into the treatment condition. This could have biased the results by creating a sample of participants who were already motivated to make behavioral changes. It is difficult to completely rule out the possibility that some findings may be due to unmeasured confounds, however, the use of propensity scoring to create a matched group of non-coached participants has been shown to help reduce bias, which was evidenced by baseline similarities between both groups in the current study.

Another potential problem was the data was not normally distributed. This was due to the fact that most participants did not vary in their healthcare outcomes because they did not have any medical claims, resulting in leptokurtic distributions. Conducting transformations improved the normality of the distribution for most variables, however some were still kurtotic. This may have led to an increase in Type 2 errors, making it difficult to detect significant effects and thus, underestimating the impact that coaching has on health outcomes. This lack of variability was also a problem for analyses involving participant wellness goals. In some cases, there were only a few participants possessing certain goals, which may have reduced the study's power to detect differences. Additional research should be conducted with samples that have more variation within their medical claims and wellness vision data.

One limitation of relying on secondary datasets is the inability to have control over the variables of interest. In the case of medical claims data, algorithms are created to capture client data on all variables; these algorithms may be more complex for variables

measuring clients' engagement with the healthcare system and their potential for increased savings (i.e., total costs for preventive health, acute, chronic disease and motivation indices). Currently it is unclear what exactly is being used to compute these variables. Unfortunately, these algorithms are proprietary making it impossible to completely understand these metrics. The results as a whole suggest that the use of acute and chronic disease indices and total costs for preventive health are sufficient measures of patient engagement. Conversely, motivation index remained largely non-significant in most analyses. One possibility for this result is that substantially more factors are used in the algorithm to compute motivation index compared to the other indices, which may introduce more error in the variable, making it less likely to detect differences that do in fact exist. Future research should conduct studies with more transparent variables to help explain any irregularities and potentially spurious results. To supplement medical claims data, additional measures like self-report data, biometric markers (e.g., weight, cholesterol levels, blood pressure), and diary entries that track participants' daily behavior could all be incorporated.

In this study, a coding scheme was developed to gain a better understanding of the types of wellness goals discussed during coaching sessions. The purpose of this scheme was to provide a concise overview of the range of goals, and given the smaller sample size, it did not make sense statistically to provide more refined categories because there would not have been enough participants in each category to find any meaningful differences. With that said, it would be useful to take a closer look within each category to see if differential effects result. For example, relational issues could be broken down into a desire to repair a relationship compared to a desire to establish one, two

conceptually different goals. Types of chronic illnesses could also be sub-categorized in order to identify if wellness coaching has a stronger effect on particular types of conditions (e.g., fibromyalgia versus diabetes). Later studies should include larger samples and a more refined coding scheme in order to fully explore these effects.

Another issue with the coding scheme is participants who had the goal of wanting to lose weight may have been obese. Because participants' initial body mass indices were not provided, it was difficult to distinguish those who were obese from those who just wanted to lose a few pounds. This distinction may have been crucial given that combating obesity may be a more complex issue because it serves as a risk factor for many chronic health conditions (CDC, 2011a). Coding obesity as its own code may have influenced analyses involving the exercise, weight and nutrition goal category. Deciding to incorporate obesity within the chronic disease management goal may have also influenced those results. However, because obesity is highly related to the presence of chronic diseases like type 2 diabetes (Golay & Ybarra, 2005) and hypertension (Kotchen, 2010), there is a good chance that obese participants indicated chronic conditions they would like to improve (e.g., reduce HbA1c levels), which would have been reflected in the coding scheme.

In addition, the use of secondary data did not allow for a direct testing of confirmation theory. Rather, the theory was implicitly applied based on an assessment of the core features of wellness coaching interventions. Given that the results are in line with findings from other studies using confirmation theory, it seems highly appropriate to apply the theory to this context. However, future research should conduct a more explicit assessment of the use of confirming messages within wellness coaching by measuring

clients' perceptions of coaches' communication. This could allow for theory development by making any necessary alterations to confirmation theory in order for it to more appropriately apply to a health intervention context.

Additional work could also assess other psychosocial (e.g., self-esteem, self-efficacy) and behavioral (e.g., behavior change) aspects that may mediate the relationship between a coaching/confirmation intervention and healthcare outcomes. More direct measures of patient engagement could also be provided as this study inferred them from claims patterns. Moreover, additional measures of healthcare outcomes can be utilized such as self-report measures of health status. This would provide multiple assessments of the impact that coaching communication has on participant outcomes, and would also allow for further testing of Street et al.'s (2009) model of communication's direct and indirect impact on health outcomes.

By surveying coaching clients, other variables could be measured such as job satisfaction, absenteeism and presenteeism. These variables could serve as additional measures to assess the return on investment of wellness coaching above and beyond healthcare costs. That is, employers may benefit from healthier employees with savings not only in healthcare expenditures, but also savings associated with employee retention, cost reductions associated with not having to replace employees who are out sick, and work performance enhancement (Aldana et al., 2005; Goetzel et al., 2004; Haynes & Dunnagan, 2002).

Finally, it became clear that several intervention participants only attended one coaching session and never returned. This was especially true for participants wanting to quit smoking. One possible explanation is that clients did not enjoy this type of

intervention. Another more likely possibility is that clients were not ready to make behavioral changes. The transtheoretical model (TTM) helps explain why interventions work for some but not others. It is an “integrative framework for understanding how individuals and populations progress toward adopting and maintaining health behavior change for optimal health” (Prochaska, Johnson, & Lee, 2009, p. 59). The theory posits different sequential stages that people move through when deciding to make a behavioral change. The first stage is the precontemplation stage where people do not intend on taking actions to make a change in the future. People in the contemplation stage are considering the pros and cons of making a change and may intend to take action towards improving a behavior in the next 6 months. People in the preparation stage are intending to take action in the immediate future, and have made a plan to do so. People in the action stage have made observable modifications to their behavior within the past 6 months. Finally, people in the maintenance stage are less tempted to engage in unhealthy behaviors and are working towards preventing relapses. Thus, future research could test whether participants’ stage of change mediates the relationship between wellness coaching participation and healthcare outcomes.

5.6 Conclusion

Designing interventions to help participants make behavioral changes is not an easy task. Wellness coaching has taken on this challenge by creating a unique type of communicative intervention that approaches the notion of health and wellness in a holistic manner, acknowledging that multiple aspects of one’s life can influence a person’s wellbeing. In order to fill gaps in the wellness coaching literature, this project sought to attain four main goals: to (1) identify whether wellness coaching interventions

and its variation had an impact on client healthcare outcomes, (2) apply confirmation theory to this context in order to provide a framework to better explain the communication mechanisms that underlie this intervention, (3) identify the various topics that are discussed during wellness coaching sessions, and (4) test whether wellness coaching interventions should be targeted to specific client populations. Results indicate that wellness coaching is associated with increased patient engagement, which leads to higher initial healthcare costs and utilization that may decline over time. Results are in line with previous research using confirmation theory, indicating that it is a viable framework to better understand this intervention. In addition, participants discuss a range of topics across four broad categories including physical health and mental, relational and financial/professional wellbeing. Finally, this communicative intervention may be targeted to clients based on types of wellness goals, wellness complexity, and client sex. This project provides the first comprehensive look at wellness coaching and has paved the way for numerous directions for future research.

REFERENCES

REFERENCES

- Aggarwal, B., & Mosca, L. (2010). Lifestyle and psychosocial risk factors predict non-adherence to medication. *Annals of Behavioral Medicine, 40*, 228-233.
<http://dx.doi.org/10.1007/s12160-010-9212-6>
- Ahern, A. L., Olson, A. D., Aston, L. M., & Jebb, S. A. (2011). Weight Watchers on prescription: An observational study of weight change among adults referred to Weight Watchers by the NHS. *BMC Public Health, 11*, 434-439. doi:
10.1186/1471-2458-11-434
- Aldana, S. G. (2001). Financial impact of health promotion programs: A comprehensive review of the literature. *American Journal of Health Promotion, 15*, 296-320.
<http://dx.doi.org/10.4278/0890-1171-15.5.296>
- Aldana, S. G., Merrill, R. M., Price, K., Hardy, A., & Hager, R. (2005). Financial impact of a comprehensive multisite workplace health promotion program. *Preventive Medicine, 40*, 131-137. <http://dx.doi.org/10.1016/j.ypmed.2004.05.008>
- Ammentorp, J., Thomsen, J., & Kofoed, P.-K. (2013). Adolescents with poorly controlled type 1 diabetes can benefit from coaching: A case report and discussion. *Journal of Clinical Psychology in Medical Settings, 20*, 343-350. doi: 10.1007/s10880-013-9374-z

- Ammentorp, J., Uhrenfeldt, L., Angel, F., Ehrensvar, M., Carlsen, E. B., & Kofoed, P. E. (2013). Can life coaching improve health outcomes? A systematic review of intervention studies. *BMC Health Services Research, 13*, 428-439. doi: 10.1186/1472-6963-13-428
- Anderson, G. (2010). Chronic care: Making the case for ongoing care. Retrieved from <http://www.rwjf.org/content/dam/farm/reports/reports/2010/rwjf54583>
- Anderson, R. M., Funnel, M. M., Nwankwo, R., Gillard, M. L., Oh, M., Fitzgerald, J. T. (2005). Evaluating a problem-based empowerment program for African Americans with diabetes: Results of a randomized controlled trial. *Ethnicity & Disease, 15*, 671-678.
- Austin, P. C. (2008a). Assessing balance in baseline covariates when using many-to-one matching on the propensity-score. *Pharmacoepidemiology and Drug Safety, 17*, 1218–1225. doi: 10.1002/pds.1674
- Austin, P. C. (2008b). Goodness-of-fit diagnostics for the propensity score model when estimating treatment effects using covariate adjustment with the propensity score. *Pharmacoepidemiology and Drug Safety, 17*, 1202–1217. doi: 10.1002/pds.1673
- Austin, P. C. (2011a). Optimal caliper widths for propensity-score matching when estimating differences in means and differences in proportions in observational studies. *Pharmaceutical Statistics, 10*, 150–161. doi: 10.1002/pst.433
- Austin, P. C. (2011b). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research, 46*, 399-424. doi: 10.1080/00273171.2011.568786

- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology & Health, 13*, 623-649. doi: 10.1080/08870449808407422
- Beaudoin, C. E., Fernandez, C., Wall, J. L., & Farley, T. A. (2007). Promoting healthy eating and physical activity: Short-term effects of a mass media campaign. *American Journal of Preventive Medicine, 32*, 217-223.
<http://dx.doi.org/10.1016/j.amepre.2006.11.002>
- Becker, E.R., & Roblin, D.W. (2008). Translating primary care practice climate into patient activation: The role of patient trust in physician. *Medical Care, 46*, 795–805. <http://dx.doi.org/10.1097/mlr.0b013e31817919c0>
- Bem, D. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6; pp. 1–62). New York: Academic Press.
- Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: Care, health, and cost. *Health Affairs, 27*, 759-769. <http://dx.doi.org/10.1377/hlthaff.27.3.759>
- Bodenheimer, T. (2007). A 63-year-old man with multiple cardiovascular risk factors and poor adherence to treatment plans. *Journal of the American Medical Association, 298*, 2048-2055. doi: 10.1001/jama.298.16.jrr70000
- Bodenheimer, T., Lorig, K., Holman, H., & Grumbach, K. (2002). Patient self-management of chronic disease in primary care. *The Journal of the American Medical Association, 288*, 2469-2475. doi: 10.1001/jama.288.19.2469
- Boles, M., Adams, A., Gredler, A., & Manhas, S. (2014). Ability of a mass media campaign to influence knowledge, attitudes, and behaviors about sugary drinks and obesity. *Preventive Medicine, 67*, S40-S45. doi:10.1016/j.ypmed.2014.07.023

- Bond, G. E., Burr, R. L., Wolf, F. M., & Feldt, K. (2010). The effects of a web-based intervention on psychosocial well-being among adults aged 60 and older with diabetes: A randomized trial. *The Diabetes Educator*, *36*, 446-456. doi: 10.1177/0145721710366758
- Branch, W. T., & Malik, T. K. (1993). Using 'windows of opportunities' in brief interviews to understand patients' concerns. *The Journal of the American Medical Association*, *269*, 1667-1668. doi: 10.1001/jama.269.13.1667
- Brashers, D. E., Neidig, J. L., & Goldsmith, D. J. (2004). Social support and the management of uncertainty for people living with HIV or AIDS. *Health Communication*, *16*, 305-331. doi: 10.1207/s15327027hc1603_3
- Brown, J. B., Stewart, M., & Ryan, B. L. (2003). Outcomes of patient-provider interaction. In T. L. Thompson, A. Dorsey, K. I. Miller, & R. Parrott (Eds.). *Handbook of health communication* (pp. 141-161). Mahwah, NJ: Lawrence Erlbaum Associates.
- Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language usage*. Cambridge: Cambridge University Press.
- Buber, M. (1965). *The knowledge of man*. New York: Harper & Row.
- Burgoon, J. K., Pfau, M., Parrott, R., Birk, T., Coker, R., & Burgoon, M. (1987). Relational communication, satisfaction, compliance- gaining strategies, and compliance in communication between physicians and patients. *Communication Monographs*, *54*, 307-324. doi: 10.1080/03637758709390235

- Burleson, B. R. (1994). Comforting messages: Features, functions, and outcomes. In J. A. Daly & J. M. Wiemann (Eds.), *Strategic interpersonal communication* (pp. 135–161). Hillsdale, NJ: Erlbaum.
- Burleson, B. R., & MacGeorge, E. L. (2002). Supportive communication. In M. L. Knapp & J. A. Daly (Eds.), *Handbook of Interpersonal Communication* (3rd ed., pp. 374–424). Thousand Oaks, CA: SAGE Publications, Inc.
- Bushe, G. R. & Coetzer, G. (1995). Appreciative inquiry as a team-development intervention: A controlled experiment. *The Journal of Applied Behavioral Science*, 31, 13-30. doi: 10.1177/0021886395311004
- Butterworth, S., Linden, A., McClay, W., & Leo, M. C. (2006). Effect of motivational interviewing-based health coaching on employees' physical and mental health status. *Journal of Occupational Health Psychology*, 11, 358-365. doi: 10.1037/1076-8998.11.4.358
- Caldwell, K. L., Gray, J., & Wolever, R. Q. (2013). The process of patient empowerment in integrative health coaching: How does it happen? *Global Advances in Health and Medicine*, 2, 48–57. doi: 10.7453/gahmj.2013.026
- Carnethon, M., Whitsel, L. P., Franklin, B. A., Kris-Etherton, P., Milani, R., Pratt, C. A., ...Wagner, G. R. (2009). Worksite wellness programs for cardiovascular disease prevention a policy statement from the American Heart Association. *Circulation*, 120, 1725–1741. doi: 10.1161/CIRCULATIONAHA.109.192653

- Centers for Disease Control and Prevention (2011a). Obesity: Halting the epidemic by making health easier. Retrieved from <http://www.cdc.gov/chronicdisease/resources/publications/aag/obesity.htm>
- Centers for Disease Control and Prevention (2011b). Burden of mental illness. Retrieved from <http://www.cdc.gov/mentalhealth/basics/burden.htm>
- Centers for Disease Control and Prevention (2013). Workplace health promotion: Rising healthcare costs are unsustainable. Retrieved from <http://www.cdc.gov/workplacehealthpromotion/nhwp/>
- Centers for Medicare and Medicaid Services (2012). National health expenditures 2012 highlights. Retrieved from <http://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/downloads/highlights.pdf>
- Chapman, L. S. (2012). Meta-evaluation of worksite health promotion economic return studies: 2012 update. *American Journal of Health Promotion*, 26, TAHP-12. <http://dx.doi.org/10.4278/ajhp.26.4.tahp>
- Ciechanowski, P. S., Katon, W. J., & Russo, J. E. (2000). Depression and diabetes: Impact of depressive symptoms on adherence, function, and costs. *Archives of Internal Medicine*, 160, 3278-3285. <http://dx.doi.org/10.1001/archinte.160.21.3278>
- Cissna, K. N., & Keating, S. (1979). Speech communication antecedents of perceived confirmation. *Western Journal of Speech Communication*, 43, 48-60. doi: 10.1080/10570317909373953

- Cissna, K. N., & Sieburg, E. (1981). Patterns of interactional confirmation and disconfirmation. In C. Wilder-Mott & J. H. Weakland (Eds.), *Rigor and imagination: Essays from the legacy of Gregory Bateson* (pp. 253-282). New York: Praeger.
- Cohen, J. T., Neumann, P. J., & Weinstein, M. C. (2008). Does preventive care save money? Health economics and the presidential candidates. *New England Journal of Medicine*, *358*, 661-663. <http://dx.doi.org/10.1056/nejmp0708558>
- Collins, S. E., Chawla, N., Hsu, S. H., Grow, J., Otto, J. M., & Marlatt, G. A. (2009). Language-based measures of mindfulness: Initial validity and clinical utility. *Psychology of Addictive Behaviors*, *23*, 743–749. doi:10.1037/a0017579.
- Conn, V. S., Hafdahl, A. R., Cooper, P. S., Brown, L. M., & Lusk, S. L. (2009). Meta-analysis of workplace physical activity interventions. *American Journal of Preventive Medicine*, *37*, 330–339. doi: 10.1016/j.amepre.2009.06.008
- Cooperrider, D. L., Whitney, D. K., & Stavros, J. M. (2003). *Appreciative inquiry handbook* (Vol. 1). Bedford Heights, OH: Lakeshore Communications.
- Cox, D. R. (1970). *The analysis of binary data*. London: Methuen.
- Cox, D. R. (1972). The analysis of multivariate binary data. *Applied Statistics*, *21*, 113-20.
- Dailey, R. M. (2006). Confirmation in parent-adolescent relationships and adolescent openness: Toward extending confirmation theory. *Communication Monographs*, *73*, 434-458. doi: 10.1080/03637750601055432

- Dailey, R. M., McCracken, A. A., & Romo, L. K. (2011). Confirmation and weight management: Predicting effective levels of acceptance and challenge in weight management messages. *Communication Monographs, 78*, 185-211. doi: 10.1080/03637751.2011.564638
- Dailey, R. M., Richards, A. A., & Romo, L. K. (2010). Communication with significant others about weight management: The role of confirmation in weight management attitudes and behaviors. *Communication Research, 37*, 644-673. doi: 10.1177/0093650210362688
- Dailey, R. M., Romo, L. K., & McCracken, A. A. (2010). Messages about weight management: An examination of how acceptance and challenge are related to message effectiveness. *Western Journal of Communication, 74*, 457-483. doi: 10.1080/10570314.2010.512279
- Dailey, R. M., Romo, L. K., & Thompson, C. M. (2011). Confirmation in couples' communication about weight management: An analysis of how both partners contribute to individuals' health behaviors and conversational outcomes. *Human Communication Research, 37*, 553-582. doi: 10.1111/j.1468-2958.2011.01414.x
- Dailey, R. M., Thompson, C. M., & Romo, L. K. (2014). Mother-teen communication about weight management. *Health Communication, 29*, 384-397. doi: 10.1080/10410236.2012.759052
- DeBar, L. L., Ritenbaugh, C., Aickin, M., Orwoll, E., Elliot, D., Dickerson, J., ... Irving, L. M. (2006). YOUTH: A health plan-based lifestyle intervention increases bone mineral density in adolescent girls. *Archives of Pediatrics & Adolescent Medicine, 160*, 1269-1276. doi: 10.1001/archpedi.160.12.1269

- Dehejia, R. H., & Wahba, S. (2002). Propensity score-matching methods for nonexperimental causal studies. *Review of Economics and Statistics*, *84*, 151-161. <http://dx.doi.org/10.1162/003465302317331982>
- Dewey, M. E. (1983). Coefficients of agreement. *British Journal of Psychiatry*, *143*, 487-489. <http://dx.doi.org/10.1192/bjp.143.5.487>
- DiMatteo, M. R., Lepper, H. S., & Croghan, T. W. (2000). Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Archives of Internal Medicine*, *160*, 2101-2107. <http://dx.doi.org/10.1001/archinte.160.14.2101>
- Djuric, Z., DiLaura, N. M., Jenkins, I., Darga, L., Jen, C. K.-L., Mood, D., ... Hryniuk, W. M. (2002). Combining weight-loss counseling with the Weight Watchers plan for obese breast cancer survivors. *Obesity Research*, *10*, 657-665. doi: 10.1038/oby.2002.89
- Do, M. P., & Kincaid, D. L. (2006). Impact of an entertainment-education television drama on health knowledge and behavior in Bangladesh: An application of propensity score matching. *Journal of Health Communication*, *11*, 301-325. doi: 10.1080/10810730600614045
- Duckworth, A. L., Steen, T. A., & Seligman, M. E. (2005). Positive psychology in clinical practice. *Annual Review of Clinical Psychology*, *1*, 629-651. doi: 10.1146/annurev.clinpsy.1.102803.144154

- Edelman, D., Oddone, E. Z., Liebowitz, R. S., Yancy, W. S., Olsen, M. K., Jeffreys, A. S., ...Gaudet, T. W. (2006). A multidimensional integrative medicine intervention to improve cardiovascular risk. *Journal of General Internal Medicine, 21*, 728-734. doi: 10.1111/j.1525-1497.2006.00495.x
- Ellis, K. (2002). Perceived parental confirmation: Development and validation of an instrument. *Southern Communication Journal, 67*, 319-334. doi: 10.1111/j.1468-2958.2000.tb00758.x
- Engbers, L. H., van Poppel, M. N., Paw, M. J. C. A., & van Mechelen, W. (2005). Worksite health promotion programs with environmental changes: A systematic review. *American Journal of Preventive Medicine, 29*, 61-70.
<http://dx.doi.org/10.1016/j.amepre.2005.03.001>
- Farrell, A., & Geist-Martin, P. (2005). Communicating social health perceptions of wellness at work. *Management Communication Quarterly, 18*, 543-592. doi: 10.1177/0893318904273691
- Fjeldsoe, B. S., Miller, Y. D., & Marshall, A. L. (2010). MobileMums: A randomized controlled trial of an SMS-based physical activity intervention. *Annals of Behavioral Medicine, 39*, 101-111. doi: 10.1007/s12160-010-9170-z
- Frates, E. P., Moore, M. A., Lopez, C. N., & McMahon, G. T. (2011). Coaching for behavior change in physiatry. *American Journal of Physical Medicine & Rehabilitation, 90*, 1074-1082. doi: 10.1097/PHM.0b013e31822dea9a
- Friedman, M. S. (1983). *The confirmation of otherness, in family, community, and society*. New York: Pilgrim Press.

- Gable, S. L., & Haidt, J. (2005). What (and why) is positive psychology? *Review of General Psychology, 9*, 103-110. doi: 10.1037/1089-2680.9.2.103
- Galantino, M. L., Schmid, P., Milos, A., Leonard, S., Botis, S., Dagan, C. Albert, W., ...Mao, J. (2009). Longitudinal benefits of wellness coaching interventions for cancer survivors. *The International Journal of Interdisciplinary Social Sciences, 4*, 41-58. doi: 10.1249/01.mss.0000353620.40199.60
- Gallant, M. P. (2003). The influence of social support on chronic illness self-management: A review and directions for research. *Health Education & Behavior, 30*, 170–195. doi: 10.1177/1090198102251030
- Geist-Martin, P., Horsley, K., & Farrell, A. (2003). Working well: Communicating individual and collective wellness initiatives. In T. L. Thompson, A. Dorsey, K. I. Miller, & R. Parrott (Eds.). *Handbook of health communication* (pp. 423-443). Mahwah, NJ: Lawrence Erlbaum Associates.
- Goetzel, R. Z., Long, S. R., Ozminkowski, R. J., Hawkins, K., Wang, S., & Lynch, W. (2004). Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *Journal of Occupational and Environmental Medicine, 46*, 398–412. doi: 10.1097/01.jom.0000121151.40413.bd
- Golay, A., & Ybarra, J. (2005). Link between obesity and type 2 diabetes. *Best Practice & Research Clinical Endocrinology & Metabolism, 19*, 649-663. <http://dx.doi.org/10.1016/j.beem.2005.07.010>

- Goldsmith, D. J., & Fitch, K. (1997). The normative context of advice as social support. *Human Communication Research, 23*, 454–476. doi: 10.1111/j.1468-2958.1997.tb00406.x
- Grant, A. M. (2006). An integrative goal-focused approach to executive coaching. In D. R. Stober & A. M. Grant (Eds.), *Evidence based coaching handbook* (pp. 153-192). Hoboken, New Jersey: John Wiley & Sons.
- Gritz, E. R., Thompson, B., Emmons, K., Ockene, J. K., McLerran, D. F., & Nielsen, I. R. (1998). Gender differences among smokers and quitters in the Working Well Trial. *Preventive Medicine, 27*, 553-561.
<http://dx.doi.org/10.1006/pmed.1998.0325>
- Hawkins, R. P., Kreuter, M., Resnicow, K., Fishbein, M., & Dijkstra, A. (2008). Understanding tailoring in communicating about health. *Health Education Research, 23*, 454–466. doi: 10.1093/her/cyn004
- Hawkins, S. Y. (2010). Improving glycemic control in older adults using a videophone motivational diabetes self-management intervention. *Research and Theory for Nursing Practice: An International Journal, 24*, 217-232. doi: 10.1891/1541-6577.24.4.217.
- Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach* (1 edition.). New York: The Guilford Press.
- Haynes, G., & Dunnagan, T. (2002). Comparing changes in health risk factors and medical costs over time. *American Journal of Health Promotion, 17*, 112–121.
doi: 10.4278/0890-1171-17.2.112

- Haynes, R. B., McDonald, H. P., & Garg, A. X. (2002). Helping patients follow prescribed treatment: Clinical applications. *Journal of the American Medical Association*, 288, 280-2883. doi: 10.1001/jama.288.22.2880
- Hibbard, J. H., Greene, J., & Overton, V. (2013). Patients with lower activation associated with higher costs; delivery systems should know their patients' 'scores'. *Health Affairs*, 32, 216-222. doi: 10.1377/hlthaff.2012.1064
- Hibbard, J. H., Mahoney, E. R., Stock, R., & Tusler, M. (2007). Do increases in patient activation result in improved self-management behaviors? *Health Services Research*, 42, 1443-1463. <http://dx.doi.org/10.1111/j.1475-6773.2006.00669.x>
- Hing, E., Cherry, D. K., Woodwell, D. A. (2005). National Ambulatory Medical Care Survey: 2003 Summary. *Advance Data: From Vital and Health Statistics*, 365, 1-48.
- Ho, D. E., Imai, K., King, G., & Stuart, E. A. (2011). MatchIt: Nonparametric preprocessing for parametric causal inference. *Journal of Statistical Software*, 42, 1-28.
- Holland, S. K., Greenberg, J., Tidwell, L., Malone, J., Mullan, J., & Newcomer, R. (2005). Community-based health coaching, exercise, and health service utilization. *Journal of Aging and Health*, 17, 697-716. doi: 10.1177/0898264305277959
- House, J. S. (1981). *Work stress and social support*. Reading, Mass: Addison-Wesley.
- Huffman, M. (2007) Health coaching: A new and exciting technique to enhance patient self-management and improve outcomes. *Home Healthcare Nurse*, 25, 271-274. doi: 10.1097/01.nhh.0000267287.84952.8f

- Izumi, S.-I., Ando, K., Ono, M., Suzukamo, Y., Michimata, A., & Fukuhara, S. (2007). Effect of coaching on psychological adjustment in patients with spinocerebellar degeneration: A pilot study. *Clinical Rehabilitation*, *21*, 987–996. doi: 10.1177/0269215507076678
- Kaiser Family Foundation and Health Research and Educational Trust (2013). *Employer health benefits Survey 2013*. Menlo Park, CA and Chicago, IL.
- Kauffman, C. (2006). Positive psychology: The science at the heart of coaching. In D. R. Stober & A. Grant (Eds.), *Evidence based coaching handbook: Putting best practices to work for your clients* (pp. 219-253). Hoboken, NJ: John Wiley & Sons.
- Kelcey, B. (2011). Covariate selection in propensity scores using outcome proxies. *Multivariate Behavioral Research*, *46*, 453-476. doi: 10.1080/00273171.2011.570164
- Kotchen, T. A. (2010). Obesity-related hypertension: Epidemiology, pathophysiology, and clinical management. *American Journal of Hypertension*, *23*, 1170-1178. doi: 10.1038/ajh.2010.172
- Laforest, L., Denis, F., Van Ganse, E., Ritleng, C., Saussier, C., Passante, N., ... & Pacheco, Y. (2010). Correlates of adherence to respiratory drugs in COPD patients. *Primary Care Respiratory Journal*, *19*, 148-154. doi:10.4104/pcrj.2010.00004
- Laing, R. D. (1961). *The self and others*. London: Tavistock.

- Laing, S. S., Hannon, P. A., Talburt, A., Kimpe, S., Williams, B., & Harris, J. R. (2012). Increasing evidence-based workplace health promotion best practices in small- and low-wage companies, Mason County, Washington, 2009. *Preventing Chronic Disease, 9*. <http://dx.doi.org/10.5888/pcd9.110186>
- Lally, P., van Jaarsveld, C. H., Potts, H. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. *European Journal of Social Psychology, 40*, 998-1009. <http://dx.doi.org/10.1002/ejsp.674>
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*, 159-174. <http://dx.doi.org/10.2307/2529310>
- Lemon, S., Zapka, J., Puleo, E., Luckmann, R., & Chasan-Taber, L. (2001). Colorectal cancer screening participation: Comparisons with mammography and prostate-specific antigen screening. *American Journal of Public Health, 91*, 1264-1272. <http://dx.doi.org/10.2105/ajph.91.8.1264>
- Linden, A., Adams, J. L., & Roberts, N. (2003). An assessment of the total population approach for evaluating disease management program effectiveness. *Disease Management, 6*, 93-102. <http://dx.doi.org/10.1089/109350703321908478>
- Linden, A., Adams, J. L., & Roberts, N. (2005). Using propensity scores to construct comparable control groups for disease management program evaluation. *Disease Management & Health Outcomes, 13*, 107-115. <http://dx.doi.org/10.2165/00115677-200513020-00004>
- Linden, A., Butterworth, S. W., & Prochaska, J. O. (2010). Motivational interviewing-based health coaching as a chronic care intervention. *Journal of Evaluation in Clinical Practice, 16*, 166-174. doi: 10.1111/j.1365-2753.2009.01300.x

- Lingam, R., & Scott, J. (2002). Treatment non-adherence in affective disorders. *Acta Psychiatrica Scandinavica*, *105*, 164-172. <http://dx.doi.org/10.1034/j.1600-0447.2002.1r084.x>
- Lochner, K. A., & Cox, C. S. (2013). Prevalence of multiple chronic conditions among Medicare beneficiaries, United States, 2010. *Preventing Chronic Disease*, *10*. <http://dx.doi.org/10.5888/pcd10.120137>
- Lorig, K. R., Ritter, P., Stewart, A. L., Sobel, D. S., Brown Jr, B. W., Bandura, A., ... Holman, H. R. (2001). Chronic disease self-management program: 2-year health status and health care utilization outcomes. *Medical Care*, *39*, 1217–1223. doi: 10.1097/00005650-200111000-00008
- Lorig, K. R., Sobel, D. S., Stewart, A. L., Brown Jr, B. W., Bandura, A., Ritter, P., ... Holman, H. R. (1999). Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: A randomized trial. *Medical Care*, *37*, 5–14. doi: 10.1097/00005650-199901000-00003
- Mansfield, A. K., Addis, M. E., & Mahalik, J. R. (2003). "Why won't he go to the doctor?": The psychology of men's help seeking. *International Journal of Men's Health*, *2*, 93-109. <http://dx.doi.org/10.3149/jmh.0202.93>
- Marcoux, B. C., Trenkner, L. L. & Rosenstock, I. M. (1990). Social networks and social support in weight loss. *Patient Education and Counseling*, *15*, 229-238. doi: [10.1016/0738-3991\(90\)90098-6](https://doi.org/10.1016/0738-3991(90)90098-6)

- Markland, D., & Vansteenkiste, M. (2007). Self-determination theory and motivational interviewing in exercise. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 87-99). Champaign, IL: Human Kinetics.
- Mattke, S., Liu, H., Caloyeras, J. P., Huang, C. Y., Busum, K. R., Khodyakov, D. & Shier, V. (2013). Workplace wellness programs study: Final report. Arlington, VA: RAND.
- McComb, K. B., & Jablin, F. M. (1984). Verbal correlates of interviewer empathic listening and employment interview outcomes. *Communication Monographs*, *51*, 353-371. doi: 10.1080/03637758409390207
- McDonald, J. H. (2009). *Handbook of biological statistics* (2nd ed.). Baltimore, MD: Sparky House Publishing.
- McKinley, C. J. (2009). Investigating the influence of threat appraisals and social support on healthy eating behavior and drive for thinness. *Health Communication*, *24*, 735–745. doi: 10.1080/10410230903264303
- McKinley, C. J., & Wright, P. J. (2014). Informational social support and online health information seeking: Examining the association between factors contributing to healthy eating behavior. *Computers in Human Behavior*, *37*, 107–116. doi: 10.1016/j.chb.2014.04.023
- Mechanic, D., & Meyer, S. (2000). Concepts of trust among patients with serious illness. *Social Science & Medicine*, *51*, 657-668. doi: 10.1016/S0277-9536(00)00014-

- Merrill, R. M., Hyatt, B., Aldana, S. G., & Kinnersley, D. (2011). Lowering employee health care costs through the healthy lifestyle incentive program. *Journal of Public Health Management and Practice, 17*, 225-232.
<http://dx.doi.org/10.1097/phh.0b013e3181f54128>
- Michalsen, A., Grossman, P., Lehmann, N., Knoblauch, N. T. M., Paul, A., Moebus, S., ...Dobos, G. J. (2005). Psychological and quality-of-life outcomes from a comprehensive stress reduction and lifestyle program in patients with coronary artery disease: Results of a randomized trial. *Psychotherapy & Psychosomatics, 74*, 344-352. doi: 10.1159/000087781
- Milani, R. V., & Lavie, C. J. (2009). Impact of worksite wellness intervention on cardiac risk factors and one-year health care costs. *The American Journal of Cardiology, 104*, 1389-1392. <http://dx.doi.org/10.1016/j.amjcard.2009.07.007>
- Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change*. New York: Guilford Press.
- Mills, P. R., Kessler, R. C., Cooper, J., & Sullivan, S. (2007). Impact of a health promotion program on employee health risks and work productivity. *American Journal of Health Promotion, 22*, 45-53. <http://dx.doi.org/10.4278/0890-1171-22.1.45>
- Mitchell, A. J., & Selmes, T. (2007a). Why don't patients take their medicine? Reasons and solutions in psychiatry. *Advances in Psychiatric Treatment, 13*, 336-346. doi: 10.1192/apt.bp.106.003194

- Mitchell, A. J., & Selmes, T. (2007b). Why don't patients attend their appointments? Maintaining engagement with psychiatric services. *Advances in Psychiatric Treatment, 13*, 423–434. doi: 10.1192/apt.bp.106.003202
- Moore, M., & Tschannen-Moran, B. (2010). *Coaching psychology manual*. Philadelphia: Wolters Kluwer Health/Lippincott, Williams & Wilkins.
- Muennig, P., Jia, H., Lee, R., & Lubetkin, E. (2008). I think therefore I am: Perceived ideal weight as a determinant of health. *American Journal of Public Health, 98*, 501-506. <http://dx.doi.org/10.2105/ajph.2007.114769>
- Munro, B. H. (2005). *Statistical methods for health care research* (4th ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.
- Naimi, T. S., Brewer, R. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge drinking Among US adults. *The Journal of the American Medical Association, 289*, 70-75. doi: 10.1001/jama.289.1.70.
- Napolitano, M. A., & Marcus, B. H. (2002). Targeting and tailoring physical activity information using print and information technologies. *Exercise and Sport Sciences Reviews, 30*, 122-128. <http://dx.doi.org/10.1097/00003677-200207000-00006>
- National Center for Health Statistics (2014). Health, United States, 2013: With special feature on prescription drugs. Retrieved from <http://www.cdc.gov/nchs/data/hus/hus13.pdf>

- Naydeck, B. L., Pearson, J. A., Ozminkowski, R. J., Day, B. T., & Goetzel, R. Z. (2008). The impact of the Highmark employee wellness programs on 4-year healthcare costs. *Journal of Occupational and Environmental Medicine, 50*, 146-156.
<http://dx.doi.org/10.1097/jom.0b013e3181617855>
- Neal, D. J., & Simons, J. S. (2007). Inference in regression models of heavily skewed alcohol use data: A comparison of ordinary least squares, generalized linear models, and bootstrap resampling. *Psychology of Addictive Behaviors, 21*, 441-452. doi: 10.1037/0893-164X.21.4.441
- Noar, S. M., Harrington, N. G., & Aldrich, R. S. (2009). The role of message tailoring in the development of persuasive health communication messages. *Communication Yearbook, 33*, 73-133.
- Nolen-Hoeksema, S. (2004). Gender differences in risk factors and consequences for alcohol use and problems. *Clinical Psychology Review, 24*, 981-1010.
<http://dx.doi.org/10.1016/j.cpr.2004.08.003>
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity in the United States, 2009–2010. *National Center for Health Statistics Data Brief, 82*, 1-8.
- Parks, K. M., & Steelman, L. A. (2008). Organizational wellness programs: A meta-analysis. *Journal of Occupational Health Psychology, 13*, 58. doi: 10.1037/1076-8998.13.1.58
- Parekh, A. K., & Barton, M. B. (2010). The challenge of multiple comorbidity for the US health care system. *The Journal of the American Medical Association, 303*, 1303-1304. doi: 10.1001/jama.2010.381

- Passmore, J., & Whybrow, A. (2007). Motivational interviewing: A specific approach for coaching psychologists. In S. Palmer & A. Whybrow (Eds.), *Handbook of coaching psychology* (pp. 160-173). New York: Routledge.
- Paulhus, D. L., & Vazire, S. (2007). The self-report method. In R. W. Robins, R. C. Fraley, & R. F. Krueger (Eds.), *Handbook of research methods in personality* (pp. 224–239). London, England: Guilford.
- Pearson, W. S., Dube, S. R., Ford, E. S., & Mokdad, A. H. (2009). Influenza and pneumococcal vaccination rates among smokers: Data from the 2006 Behavioral Risk Factor Surveillance System. *Preventive medicine, 48*, 180-183. doi: 10.1016/j.ypmed.2008.11.001
- Prilleltensky, I. (2005). Promoting well-being: Time for a paradigm shift in health and human services. *Scandinavian Journal of Public Health, 33*, 53–60. doi: 10.1080/14034950510033381
- Prochaska, J. O., Johnson, S., & Lee, P. (2009). The Transtheoretical Model of behavior change. In S. A. Shumaker, J. K. Ockene, & K. A. Riekert (Eds.), *The handbook of health behavior change* (3rd ed., pp. 59-83). New York: Springer.
- Prochaska, J. J., Velicer, W. F., Prochaska, J. O., Delucchi, K., & Hall, S. M. (2006). Comparing intervention outcomes in smokers treated for single versus multiple behavioral risks. *Health Psychology, 25*, 380. <http://dx.doi.org/10.1037/0278-6133.25.3.380>

- Ramírez, A. S., Freres, D., Martinez, L. S., Lewis, N., Bourgoin, A., Kelly, B. J., & Lee, C.-J. (2013). Information seeking from media and family/friends increases the likelihood of engaging in healthy lifestyle behaviors. *Journal of Health Communication, 18*, 527-542. doi: 10.1080/10810730.2012.743632
- Resnicow, K., Baskin, M. L., Rahotep, S. S., Periasamy, S., & Rollnick, S. (2004). Motivational interviewing in health promotion and behavioral medicine. In W. M. Cox & E. Klinger (Eds.), *Handbook of motivational counseling: Concepts, approaches, and assessment* (pp. 457-476). Chichester, West Sussex, England: J. Wiley.
- Rimer, B. K. & Kreuter, M. W. (2006) Advancing tailored health communication: A persuasion and message effects perspective. *Journal of Communication, 56*, S184–S201. doi: 10.1111/j.1460-2466.2006.00289.x
- Robertson, J. M., & Fitzgerald, L. F. (1992). Overcoming the masculine mystique: Preferences for alternative forms of assistance among men who avoid counseling. *Journal of Counseling Psychology, 39*, 240-246. <http://dx.doi.org/10.1037/0022-0167.39.2.240>
- Rogers, C. R. (1951). *Client-centered therapy: Its current practice, implications, and theory*. Boston: Houghton Mifflin.
- Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*, 41–55. <http://dx.doi.org/10.1093/biomet/70.1.41>

- Rubin, D. B., & Thomas, N. (1996). Matching using estimated propensity scores: Relating theory to practice. *Biometrics*, *52*, 249-264.
<http://dx.doi.org/10.2307/2533160>
- Schneider, J. I., Hashizume, J., Heak, S., Maetani, L., Ozaki, R. R., & Watanabe, D. L. (2011). Identifying challenges, goals and strategies for success for people with diabetes through life coaching. *Journal of Vocational Rehabilitation*, *34*, 129–139. doi: 10.3233/JVR-2010-0541
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin.
- Sherbourne, C. D., Hays, R. D., Ordway, L., DiMatteo, M. R., & Kravitz, R. L. (1992). Antecedents of adherence to medical recommendations: Results from the Medical Outcomes Study. *Journal of Behavioral Medicine*, *15*, 447–468. doi: 10.1007/bf00844941
- Sieburg, E. (1976). Confirming and disconfirming organizational communication. In J. L. Owen, P. A. Page, & G. I. Zimmerman (Eds.), *Communication in organizations* (pp. 129-149). St. Paul, MN: West.
- Sieburg, E. (1985). *Family communication: An integrated systems approach*. New York: Gardner Press.
- Smith, R. A., Downs, E., & Witte, K. (2007). Drama theory and entertainment education: Exploring the effects of a radio drama on behavioral intentions to limit HIV transmission in Ethiopia. *Communication Monographs*, *74*, 133-153. doi: 10.1080/03637750701393048

- Spittaels, H., & De Bourdeaudhuij, I. (2007). Who participates in a computer-tailored physical activity program delivered through the Internet? A comparison of participants' and non-participants' characteristics. *International Journal of Behavioral Nutrition and Physical Activity*, 4, 39-47.
<http://dx.doi.org/10.1186/1479-5868-4-39>
- Stiff, J. B., Dillard, J. P., Somera, L., Kim, H., & Sleight, C. (1988). Empathy, communication, and prosocial behavior. *Communication Monographs*, 55, 198-213. doi: 10.1080/03637758809376166
- Street, R. L., Makoul, G., Arora, N. K., Epstein, R. M. (2009). How does communication heal? Pathways linking clinician-patient communication to health outcomes. *Patient Education and Counseling*, 74, 295-301. doi: 10.1016/j.pec.2008.11.015
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn & Bacon.
- Tai-Seale, M., McGuire, T. G., & Zhang, W. (2007). Time allocation in primary care office visits. *Health Services Research*, 42, 1871-1894.
<http://dx.doi.org/10.1111/j.1475-6773.2006.00689.x>
- Thomas, L. T., & Levine, T. R. (1994). Disentangling listening and verbal recall: Related but separate constructs? *Human Communication Research*, 21, 103-127. doi: 10.1111/j.1468-2958.1994.tb00342.x
- Thong, M. S., Kaptein, A. A., Krediet, R. T., Boeschoten, E. W., & Dekker, F. W. (2007). Social support predicts survival in dialysis patients. *Nephrology Dialysis Transplantation*, 22, 845-850. doi: 10.1093/ndt/gfl700

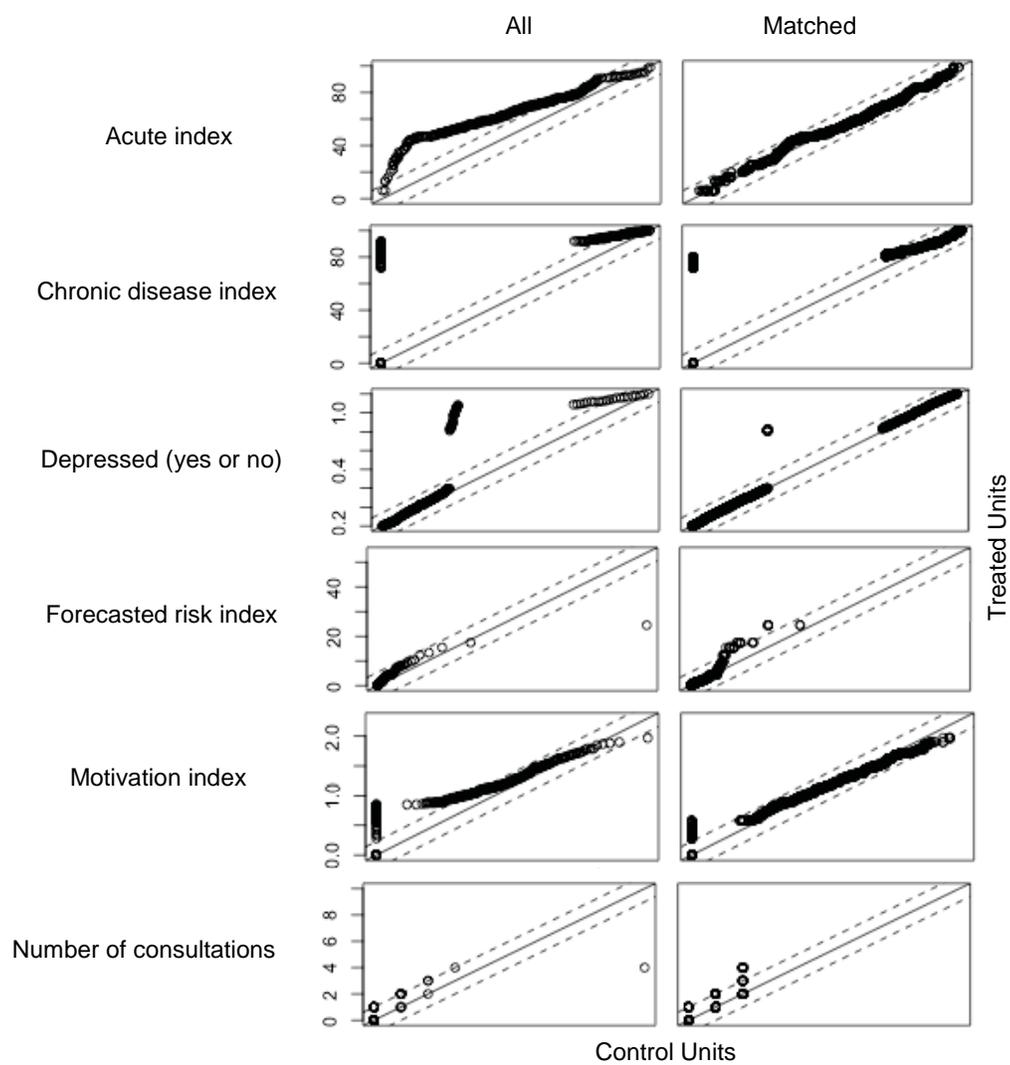
- Thornton, P. L., Kieffer, E. C., Salabarría-Peña, Y., Odoms-Young, A., Willis, S. K., Kim, H., & Salinas, M. A. (2006). Weight, diet, and physical activity-related beliefs and practices among pregnant and postpartum Latino women: the role of social support. *Maternal and Child Health Journal, 10*, 95–104. doi: 10.1007/s10995-005-0025-3
- Tidwell, L., Holland, S. K., Greenberg, J., Malone, J., Mullan, J., & Newcomer, R. (2004). Community-based nurse health coaching and its effect on fitness participation. *Professional Case Management, 9*, 267-279. doi: 10.1097/00129234-200411000-00006
- Valderas, J. M., Starfield, B., Sibbald, B., Salisbury, C., & Roland, M. (2009). Defining comorbidity: Implications for understanding health and health services. *The Annals of Family Medicine, 7*, 357-363. doi: 10.1370/afm.983
- Vale, M. J., Jelinek, M. V., Best, J. D., Dart, A. M., Grigg, L. E., Hare, D. L., ... & McNeil, J. J. (2003). Coaching patients on achieving cardiovascular health (COACH): A multicenter randomized trial in patients with coronary heart disease. *Archives of Internal Medicine, 163*, 2775-2783. doi: 10.1001/archinte.163.22.2775
- Vale, M. J., Jelinek, M. V., Best, J. D., & Santamaria, J. D. (2002). Coaching patients with coronary heart disease to achieve the target cholesterol: A method to bridge the gap between evidence-based medicine and the “real world” – randomized controlled trial. *Journal of clinical epidemiology, 55*, 245-252. doi: 10.1016/s0895-4356(01)00460-7

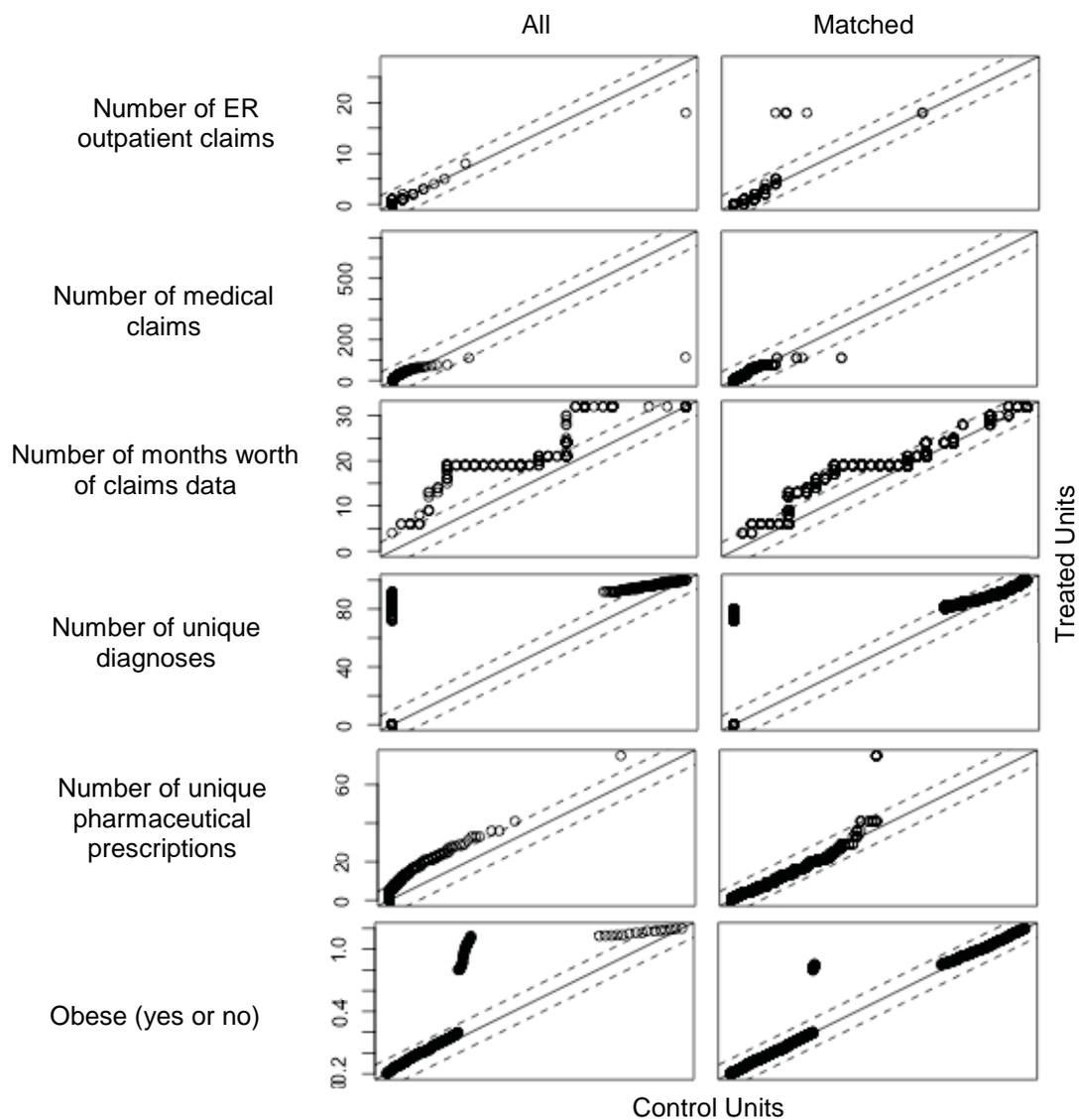
- Valenzuela, S., Arriagada, A., & Scherman, A. (2014). Facebook, Twitter, and youth engagement: A quasi-experimental study of social media use and protest behavior using propensity score matching. *International Journal of Communication, 8*, 2046–2070.
- Walters, J., Cameron-Tucker, H., Wills, K., Schüz, N., Scott, J., Robinson, A., ... & Walters, E. H. (2013). Effects of telephone health mentoring in community-recruited chronic obstructive pulmonary disease on self-management capacity, quality of life and psychological morbidity: A randomised controlled trial. *BMJ Open, 3*, e003097. doi:10.1136/bmjopen-2013-003097
- Wanzer, M. B., Booth-Butterfield, M., & Gruber, K. (2004). Perceptions of health care providers' communication: Relationships between patient-centered communication and satisfaction. *Health Communication, 16*, 363-384. doi: 10.1207/S15327027HC1603_6
- Watzlawick, P., Beavin, J. H., & Jackson, D. D. (1967). *Pragmatics of human communication*. New York: Norton.
- Whittemore, R., Chase, S., Mandle, C. L., & Roy, S. C. (2001). The content, integrity, and efficacy of a nurse coaching intervention in type 2 diabetes. *The Diabetes Educator, 27*, 887-898. doi: 10.1177/014572170102700614
- Whittemore, R., Melkus, G. D., Sullivan, A., & Grey, M. (2004). A nurse-coaching intervention for women with type 2 diabetes. *The Diabetes Educator, 30*, 795-804. doi: 10.1177/014572170403000515

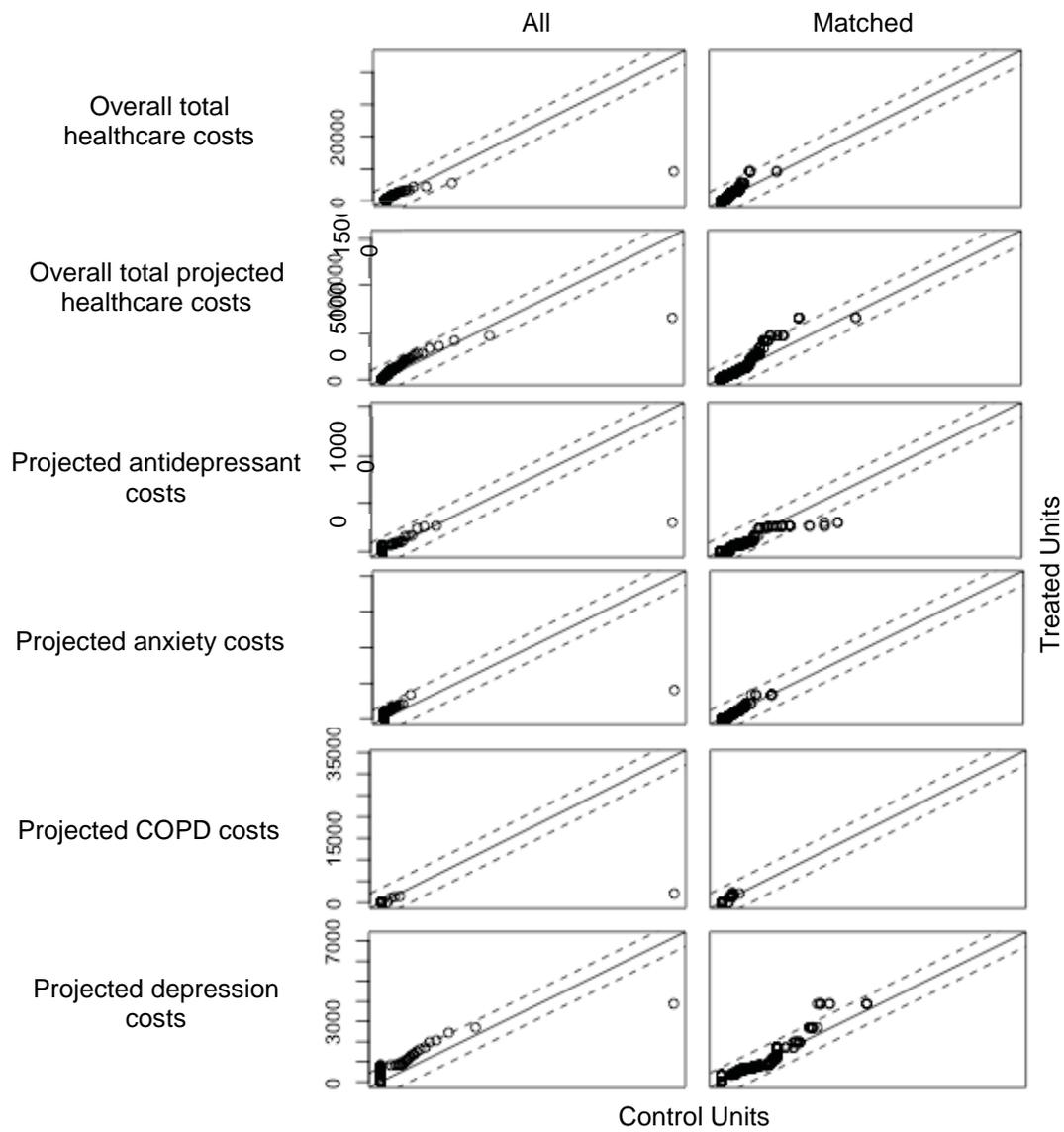
- Wierdsma, J., van Zuilen, A., & van der Bijl, J. (2011). Self- efficacy and long- term medication use in patients with chronic kidney disease. *Journal of Renal Care*, 37, 158-166. <http://dx.doi.org/10.1111/j.1755-6686.2011.00227.x>
- Winkelman, R., & Mehmud, S. (2007). *A comparative analysis of claims-based tools for health risk assessment*. Schaumburg, IL: Society of Actuaries.
- Wolever, R. Q., Dreusicke, M., Fikkan, J., Hawkins, T. V., Yeung, S., Wakefield, J., ... Skinner, E. (2010). Integrative health coaching for patients with type 2 diabetes a randomized clinical trial. *The Diabetes Educator*, 36, 629-639. doi: 10.1177/0145721710371523
- Yaemsiri, S., Slining, M. M., & Agarwal, S. K. (2011). Perceived weight status, overweight diagnosis, and weight control among US adults: The NHANES 2003–2008 Study. *International Journal of Obesity*, 35, 1063-1070. <http://dx.doi.org/10.1038/ijo.2010.229>
- Young, H., Miyamoto, S., Ward, D., Dharmar, M., Tang-Feldman, Y., & Berglund, L. (2014). Sustained effects of a nurse coaching intervention via telehealth to improve health behavior change in diabetes. *Telemedicine and e-Health*, 20, 828-834. <http://dx.doi.org/10.1089/tmj.2013.0326>

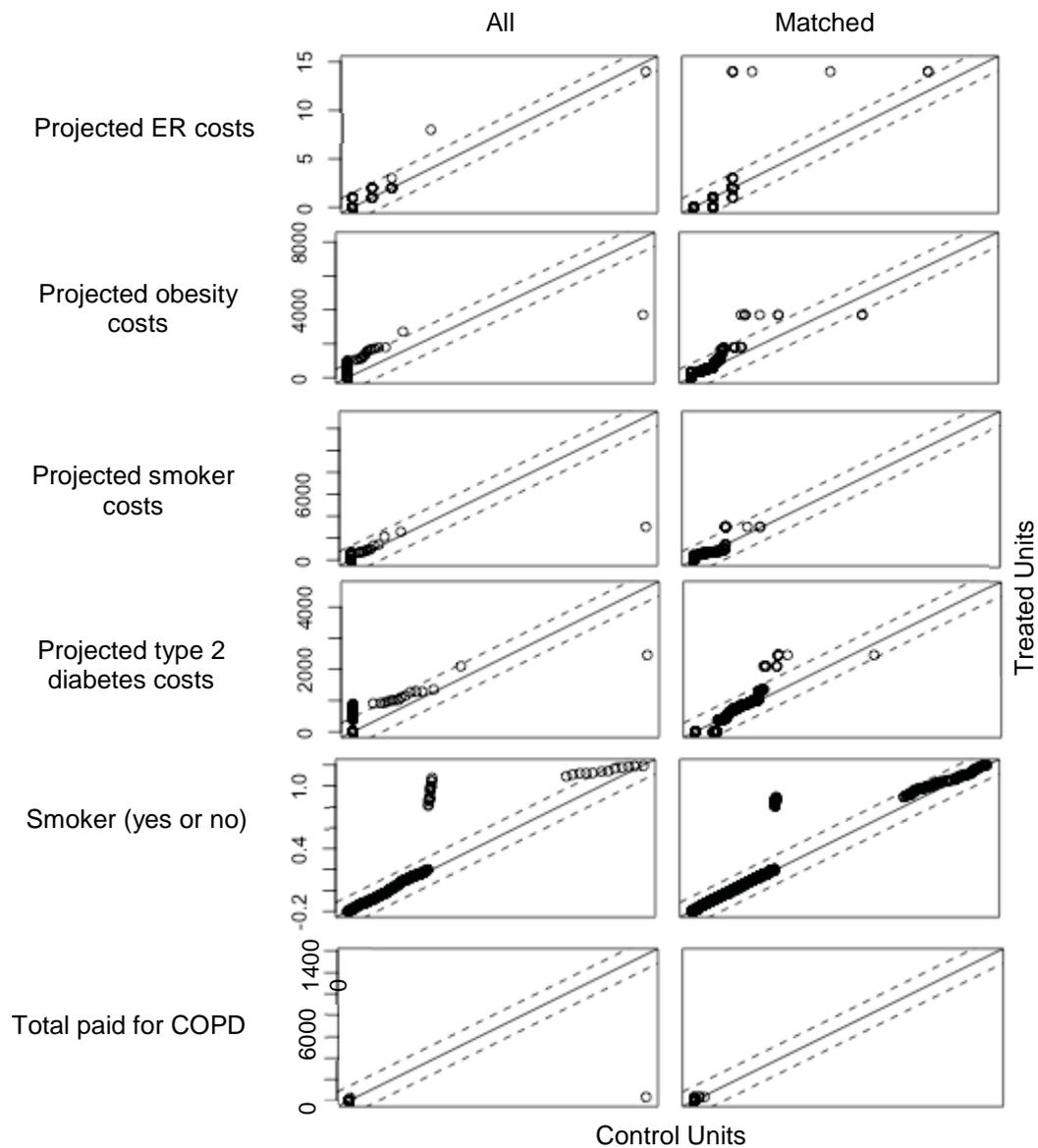
APPENDICES

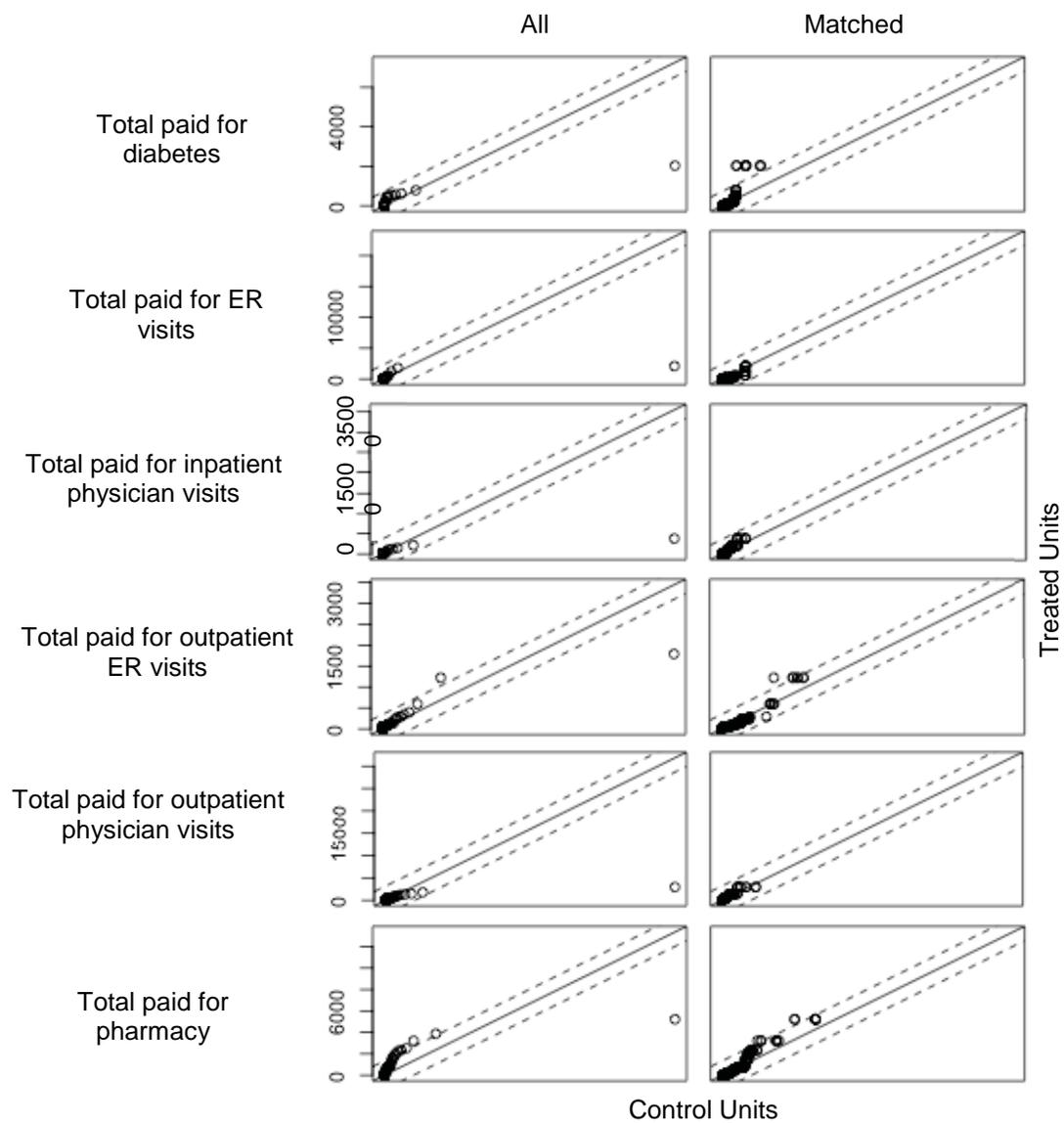
Appendix A Q-Q Plots Comparing Propensity Scores Between Treated and Control Matched and Un-matched Samples

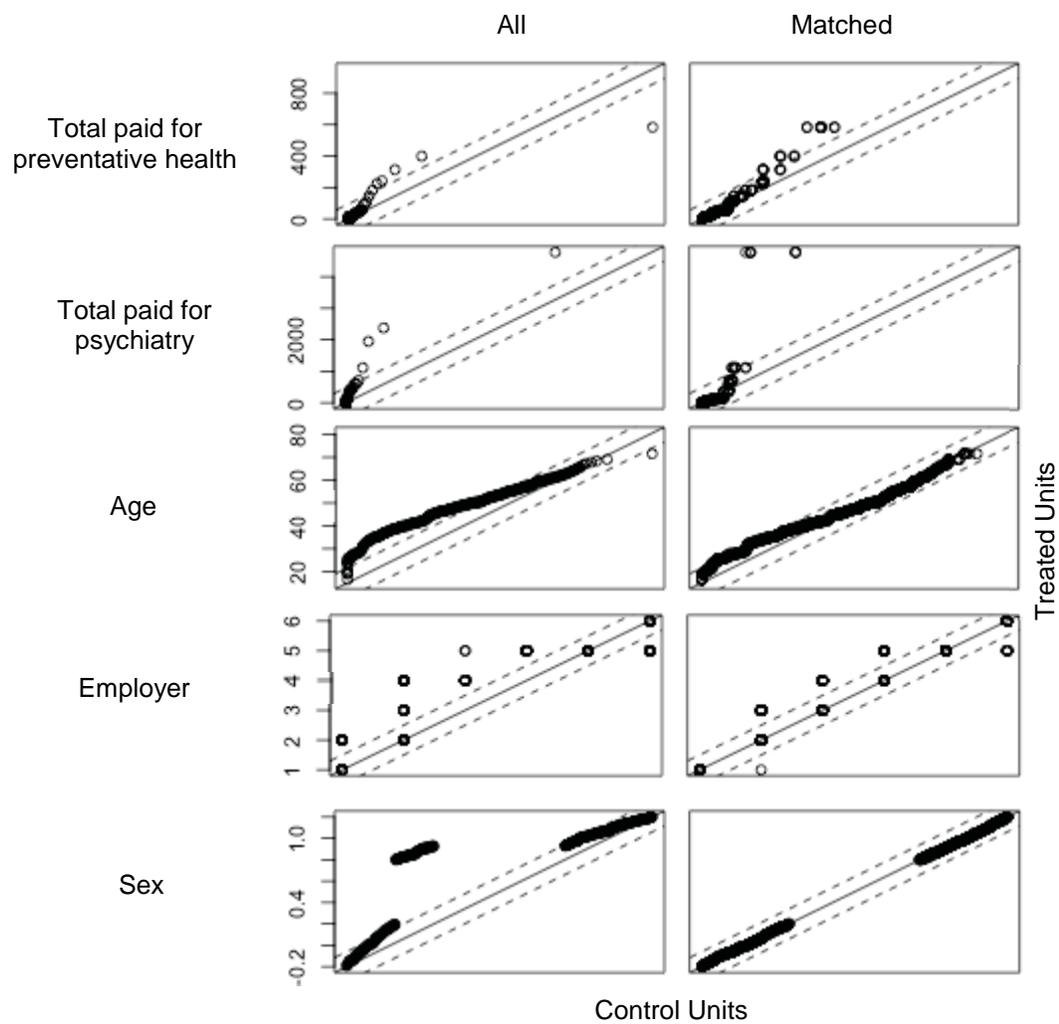












Appendix B Means for Original and Matched Coached and Non-coached Groups

	Original		Matched	
	Coached <i>M</i>	Non-coached <i>M</i>	Coached <i>M</i>	Non-coached <i>M</i>
Acute index	64.01	47.53	62.60	62.90
Chronic disease index	50.64	25.41	48.10	41.35
Depressed (yes or no)	.17	.06	.14	.13
Forecasted risk index	2.06	1.15	1.85	1.74
Motivation index	.99	.73	1.00	.98
Number of consultations	.21	.09	.18	.14
Number of ER outpatient claims	.23	.17	.20	.18
Number of medical claims	15.90	10.07	14.29	13.16
Number of months worth of claims data	23.53	16.90	23.03	22.40
Number of prescriptions	7.45	2.77	6.77	6.94
Number of unique diagnoses	10.83	5.53	9.93	9.34
Obese (yes or no)	.20	.04	.16	.13
Projected antidepressant costs	100.37	63.51	108.07	130.29
Projected anxiety costs	182.48	40.74	122.57	130.45
Projected COPD costs	18.37	27.03	16.29	10.40
Projected depression costs	161.10	59.12	120.29	111.97
Projected ER costs	.24	.14	.20	.19
Projected obesity costs	163.26	32.76	115.60	85.56
Projected total healthcare costs	5928.67	3449.93	5364.62	5047.18
Projected smoker costs	76.14	40.37	52.87	44.63
Projected type 2 diabetes costs	109.92	40.44	97.64	78.04
Smoker (yes or no)	.08	.04	.07	.06
Total healthcare costs	400.17	288.52	346.15	320.24
Total costs for COPD	1.94	2.80	2.07	.58
Total costs for diabetes	22.91	10.16	18.90	12.21
Total costs for ER visits	28.45	22.55	21.15	23.92
Total costs for inpatient physician visits	33.88	55.79	36.48	28.84
Total costs for outpatient ER visits	22.03	13.08	14.23	15.15
Total costs for outpatient physician visits	99.34	106.16	87.26	77.63
Total costs for pharmacy	174.41	48.59	133.86	132.96
Total costs for preventive health	12.76	6.31	13.36	12.12
Total costs for psychiatry	54.72	10.77	34.32	25.48
Age	46.56	38.26	46.09	44.98
Employer	3.87	3.57	3.78	3.78
Sex	.72	.51	.74	.74

Appendix C Wellness Coaching Coding Scheme

Instructions: Place a “1” in the spreadsheet anytime you see participants refer to *physical health, mental wellbeing, relational wellbeing,* and/or *financial & professional wellbeing* goals. If participants do not reference a goal, place a “0” in the spreadsheet. In other words 1 = presence of goal, 0 = absence of goal.

If you code for *physical health* and *mental wellbeing*, place a “1” in the appropriate sub-category(ies) box.

Participants may refer to more than one category or sub-category. For example, if a person wants to reduce the amount of stress they have and also improve their self-management of bipolar disorder, you would place a “1” in the *mental wellbeing* category and a “1” in the *reduce negative mental states* sub-category. Even though there are two *negative mental state* sub-categories (stress and bipolar disorder), still only put a “1” in the box.

*Code names are in parentheses.

Category	Description	Sub-Categories & Key Terms	Examples
Physical Health (Physical)	Code when participants indicate that they want to make improvements to their physical health. This includes losing weight, improving the management of a chronic condition, improving their sleep habits, and quitting smoking. Physical health has sub-categories. If you place a “1” in this category, be sure to place a “1” in the	Exercise, Nutrition, Weight (P_ExNutWgt) Includes: <ul style="list-style-type: none"> • Being more active – going to the gym, hiking, swimming, etc. • Having more energy - includes having more energy to keep up with family members/friends • Losing weight or dropping a size in clothing • Being more toned/fit • Improving nutrition - eating healthier, drinking more water, 	<ul style="list-style-type: none"> • To wear a size 10. • To weigh 160 pounds. • To have energy and be more active. • To play with my dogs outside without being out of breath. • To be in better physical shape so I'm not wheezing when I bend over to pick up something. • To eat more natural foods and less processed foods. • To be fit and toned. • To expand my fitness routine to

	corresponding sub-category(ies) box.	drinking less alcohol	include swimming.
		<p>Improve chronic condition(s) (P_ChronCond)</p> <p>Includes:</p> <ul style="list-style-type: none"> • Reducing medications • Improving HbA1c levels • Improving cholesterol, high blood pressure, etc. • Reducing pain 	<ul style="list-style-type: none"> • To not be in as much pain related to my fibromyalgia. • To be on fewer medications. • To get my A1c level below 7. • To get off Metform. • To turn back the clock on diabetes, high cholesterol and high blood pressure.
		Improve sleep (P_Sleep)	<ul style="list-style-type: none"> • To get to bed by 10:30 at night. • To form a regular sleep pattern.
		Quit smoking (P_Smoke)	<ul style="list-style-type: none"> • To be smoke free.
Mental Wellbeing (Mental)	<p>Code when participants indicate that they want to make improvements to their mental wellbeing. This includes reducing negative mental states, increasing internal happiness, improving work/life balance and quality of life, and getting organized/de-cluttering.</p> <p>Mental wellbeing has sub-categories. If you place a “1” in this category, be sure to place a “1” in the corresponding sub-category(ies) box.</p>	<p>Reduce negative mental states (M_NegSt)</p> <p>Includes:</p> <ul style="list-style-type: none"> • Reducing depression, stress, anxiety, etc. • Coping with issues from past • Improving self-management of a mental disorder 	<ul style="list-style-type: none"> • To decrease my depression and anxiety. • To work through the effects of being in the car accident. • To work through my feelings associated with my grandma's death. • To cope with my schizophrenia.
		<p>Increase internal positivity (M_Positive)</p> <p><i>*This code focuses on improving internal feelings (e.g., happiness, enjoyment, confidence, etc.)</i></p> <p>Includes:</p>	<ul style="list-style-type: none"> • To feel better about myself. • To enjoy life. • To have more control in my life. • To find internal happiness. • To increase positive self-talk.

		<ul style="list-style-type: none"> • Being happier • Enjoying life • Improving body image • Increasing confidence 	
		<p>Improve work/life balance & quality of life (M_WorkLife)</p> <p><i>*In contrast to the internal positivity code, this focuses on external states where the participant wants to engage in more, or less, activities or make external changes to improve overall quality of life/life satisfaction</i></p> <p>Includes:</p> <ul style="list-style-type: none"> • Increasing hobbies – knitting, traveling, golfing, “me time” • Working less • Going to church 	<ul style="list-style-type: none"> • To focus on work when at work and on family when with family. • To create "me" time. • To have more balance between work and home. • To have more personal time to focus on volunteering. • To have an established church and have a routine for attending service.
		<p>Get organized/de-clutter (M_Organize)</p>	<ul style="list-style-type: none"> • To be totally organized. • To have my life be organized, clean and de-cluttered.
Relational Wellbeing (Relational)	Code when participants indicate that they want to improve a relationship with a specific other or others more generally. This includes spending more time with others, repairing	<ul style="list-style-type: none"> • Improve relationships with specific people • Be more social - do more things with others • Establish a relationship (e.g., getting a significant other) • Improve communication with 	<ul style="list-style-type: none"> • To be more social. • To have a group of close-knit friends. • To argue and fight less with my husband. • To have a better, more connected relationship with my wife where

	relationships, being more social in general, and connecting with others. Place a “1” in this category anytime a type of relationship is mentioned (child, mom, friend, significant other, etc.), with the exception of references to being a role model	<p>others</p> <ul style="list-style-type: none"> • Connect with others 	<p>we appreciate each other more, are less critical of each other, and spend time doing things together.</p> <ul style="list-style-type: none"> • To have more energy to keep up with my grandkids. <i>*This would be coded as Exercise/Nutrition/Weight and Relational</i>
Financial & Professional Wellbeing (Fin_Prof)	Code when participants indicate that they want to improve their financial or professional situation. This includes getting finances in order, getting a job, getting a promotion, making more money, and/or changing careers/going back to school	<ul style="list-style-type: none"> • Get a job • Get a promotion/doing well at work • Make more money – including being able to buy things (e.g., car, house) • Get finances in order • Go back to school 	<ul style="list-style-type: none"> • To get a job, make money, and get a car. • To go to college and major in business. • To work part time in retail or substitute teaching. • To be successful at work and add value to the company.
Other	Any other goals that don't fit the other categories		

Appendix D Percentages of Types of Wellness Goals

	Goal											
	1	1_1	1_2	1_3	1_4	2	2_1	2_2	2_3	2_4	3	4
Sex												
Male (N=64)	48.6	38.5	19.3	2.8	11.9	17.4	8.3	5.5	7.3	0.9	13.8	5.5
Female (N=166)	56.8	50.8	12.0	7.2	8.4	36.4	20.0	16.0	10.8	2.4	14.4	8.4
Age												
<30 (N=24)	48.6	45.7	8.6	2.9	8.6	40.0	20.0	20.0	14.3	0.0	31.4	17.1
30-40 (N=37)	50.0	40.3	6.5	6.5	9.7	25.8	11.3	14.5	6.5	1.6	12.9	14.5
41-50 (N=55)	55.7	46.6	12.5	5.7	11.4	31.8	17.0	13.6	10.2	3.4	8.0	4.5
51-60 (N=76)	57.4	51.3	18.3	8.7	7.0	33.9	20.9	12.2	8.7	1.7	13.0	6.1
>60 (N=38)	54.2	47.5	20.3	1.7	11.9	22.0	10.2	6.8	11.9	1.7	16.9	1.7
Health risk status												
1 (N=30)	41.7	35.4	8.3	2.1	8.3	25.0	14.6	8.3	6.3	0.0	18.8	14.6
2 (N=47)	58.6	52.9	14.3	10.0	5.7	34.3	11.4	18.6	12.9	4.3	18.6	7.1
3 (N=76)	54.4	50.0	15.8	6.1	6.1	37.7	21.9	11.4	14.0	2.6	14.0	8.8
4 (N=49)	61.3	53.3	14.7	6.7	13.3	25.3	16	9.3	5.3	1.3	12.0	5.3
5 (N=28)	50.0	34.6	15.4	1.9	17.3	23.1	13.5	17.3	5.8	0.0	7.7	1.9
Total (N=258)*	55.3	47.3	14.0	5.9	10.3	31.8	17.8	13.2	9.6	2.1	15.5	8.3

Note. 1 = Physical = Improve physical health. 1_1 = Improve exercise, nutrition, and weight. 1_2 = Improve chronic condition. 1_3 = Improve sleep habits. 1_4 = Quit smoking. 2 = Improve mental wellbeing. 2_1 = Reduce negative mental state. 2_2 = Increase internal positivity. 2_3 = Improve work/life balance and quality of life. 2_4 = Get organize/de-clutter. 3 = Improve relational wellbeing. 4 = Improve financial and professional wellbeing. *There was missing data for 28 participants.

NOTES

NOTES

¹ An ‘Other’ category was included for goals that did not fit the previous classifications. This category was only used in one instance – a participant indicated that he/she wanted to get off house arrest – thus this category was not included in analyses.

² Pillai’s Trace, as opposed to other multivariate statistics, is reported because of its robustness to unequal sample sizes (Tabachnick & Fidell, 2007).

³ The test for significant mediation in Hayes’ (2013) PROCESS macro relies on an analysis of confidence intervals based on bootstrap samples. The use of a bootstrapping technique does not require normally distributed data. Moreover, Hayes states that the separate regression coefficients in the model (i.e., paths a and b) do not need to be significant to validate the mediation model. Thus, non-normally distributed variables do not need to be transformed to test for mediation effects. In this project, all analyses were run with transformed and non-transformed mediating and dependent variables. No differences existed between the interpretation of the results, thus to remain consistent with all other analyses reported in the manuscript, all transformed cost-related variables were used in the mediation analysis and count variables were left untransformed.

VITA

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EDUCATION

- Ph. D. **Purdue University**, West Lafayette, IN 2015
 Brian Lamb School of Communication
 Dissertation: *Employee wellness coaching as an interpersonal communication intervention: Exploring intervention effects on healthcare costs, risks, and behaviors*
 Co-advisors: Melanie Morgan and William B. Collins
 Committee Members: Steve Wilson, Howard Sypher, Cleve Shields
- M. A. **Purdue University**, West Lafayette, IN 2010
 Brian Lamb School of Communication
 Thesis: *The communication of sexual identity images in a self-presentational context*
 Advisor: Jim Tyler
 Committee Members: John Greene, Steve Wilson
- B. A. **Bryant University**, Smithfield, RI 2008
 Major: Communication
 Minor: Psychology

ACADEMIC APPOINTMENTS

RESEARCH

- Post Doctoral Research Fellow** 2015 – Present
 Center for Instructional Excellence, Purdue University

Research Fellow, Dr. William B. Collins 2014 – 2015
 Regenstrief Center for Healthcare Engineering, Purdue University

Research Assistant, Dr. Jim M. Tyler 2010
 Brian Lamb School of Communication, Purdue University

PEDAGOGY

Associate Course Director, Fundamentals of Presentational Speaking 2014 – 2015
 Brian Lamb School of Communication, Purdue University

Assistant Course Director, Fundamentals of Presentational Speaking 2011 – 2014
 Brian Lamb School of Communication, Purdue University

Teaching Assistant 2008 – 2014
 Brian Lamb School of Communication, Purdue University

Teaching Assistant 2009 – 2010
 College of Science, Purdue University

PUBLICATIONS

Fedesco, H. N. (in press). The impact of (in)effective listening on interpersonal interactions. *International Journal of Listening*.

Fedesco, H. N. (2014). Using Telestrations™ to illustrate small group communication principles. *Communication Teacher*, 28, 150-154.

Tyler, J. M., Connaughton S. L., Desrayaud, N., & **Fedesco, H. N.** (2012). Organizational impression management: Utilizing anticipatory tactics. *Basic and Applied Social Psychology*, 34, 336-348.

Tyler, J. M., Burns, K. C., & **Fedesco, H. N.** (2011). Preemptively adjusting self-presentations to create desired images for future identity goals. *Social Influence*, 6, 259-273.

Fedesco, H. N. & Tyler, J. M. (2011). The communication of sexual identity images in a self-presentational context. *Social Influence*, 6, 57-67.

CONFERENCE PRESENTATIONS

- Fedesco, H. N., Collins, W. B., & Jiang, W.** (2015). The impact of chronic disease self-management programs on patient empowerment. Paper to be presented at the annual meeting of the International Communication Association, San Juan, Puerto Rico.
- Fedesco, H. N. & Ekanayake, V. K.** (2014). Differences in Chinese and Caucasian perceptions of and willingness to disclose mental illness. Paper presented at the annual meeting of the National Communication Association, Chicago, Illinois.
- **Fedesco, H. N.** (2013). Using telephone pictionary to illustrate small group communication principles. Paper presented at the annual meeting of the National Communication Association, Washington D. C.. **Top G.I.F.T.S. Idea**
- Anderson, L. B. & **Fedesco, H. N.** (2013). 'Think like a scholar': Communicating the possible among communication scholars in the basic course. Paper presented at the annual meeting of the Central States Communication Association, Kansas City, Missouri.
- Fedesco, H. N. & MacArthur, B.** (2012). NCA's teachers on teaching III: Building community through exemplary teaching. Panel presented at the annual meeting of the National Communication Association, Orlando, Florida.
- Fedesco, H. N. & Tyler, J. M.** (2011). The communication of sexual identity-images in a self-presentational context. Paper presented at the annual meeting of the National Communication Association, New Orleans, Louisiana.
- Fedesco, H. N. & Tyler, J. M.** (2011). Identifying favorable and unfavorable sexual identity images. Paper presented at the annual meeting of the National Communication Association, New Orleans, Louisiana.
- Tyler, J. M., Gill-Rosier, J., & **Fedesco, H. N.** (2010). Examining self-presentation as a motivational explanation for comparative optimism. Paper presented at the annual meeting of the National Communication Association, San Francisco, California.
- **Fedesco, H. N., & Berkos, K. M.** (2008). Getting to grad school! An independent study involving undergraduate/faculty research collaboration. Paper presented at the annual meeting of the National Communication Association, San Diego, California. **Top Panel Award**

ADDITIONAL RESEARCH EXPERIENCE

- Dr. Cleve Shields & Dr. Stewart Alexander, Purdue University** 2013 – Present
Promoting Autonomy in Teen Health
- Development of interview protocol
 - Conducted interviews with adolescents and LGBTQ college students
- Dr. Cleve Shields, Purdue University** 2013 – Present
Randomized controlled trial of patient, caregiver, and physician communication coaching in advanced cancer
- Developed prognosis communication manual
 - Coded transcripts
 - Trained undergraduates to code transcripts
- Dr. John Greene, Purdue University** 2014 – Present
Exploring transcendence in interpersonal interactions
- Trained confederates
 - Oversaw experiments in research lab
 - Analyzed data
- Dr. Lisa Hanasono, Purdue University** 2011
Data Analyst
- Coded questionnaires for a research project on discrimination
- Dr. Steve Wilson, Purdue University** 2009
Passport Towards Success
- Verified and documented the implementation of program activities
 - Recorded field notes for group activities involving youth participants
- Dr. Jennifer Gill Rosier, Purdue University** 2009
Data Analyst
- Coded questionnaires for a research project on sexual communication

AWARDS AND HONORS

- Graduate School's Excellence in Teaching Award, Purdue University** 2015
Purdue University
- Purdue's highest honor given to graduate students who show excellence in teaching, research and service.

- Teaching Academy Graduate Teaching Award** 2015
Purdue University
- A university level award that honors graduate students for their outstanding teaching contributions.
- Bruce Kendall Award for Excellence in Teaching** 2014
Brian Lamb School of Communication, Purdue University
- A competitively selected award given to a graduate student who best demonstrates excellence in teaching, research and service.
- Advanced Graduate Teaching Certificate** 2014
Center for Instructional Excellence, Purdue University
- A certificate awarded to graduate students who have extensive experience with mentoring, training other TAs, developing teaching scholarship, and who have completed at least 27 hours of instructional development courses.
- Alan H. Monroe Graduate Scholar** 2014
Brian Lamb School of Communication, Purdue University
- A designation given to graduate students who demonstrate scholarly excellence based on their record of research.
- Graduate Teaching Certificate** 2013
Center for Instructional Excellence, Purdue University
- A certificate awarded to graduate students with exceptional pedagogical development and experience.
- Bruce Kendall Award for Excellence in Teaching, Honorable Mention** 2013
Brian Lamb School of Communication, Purdue University
- A competitively selected award given to a graduate student who best demonstrates excellence in teaching, research and service.
- Top Idea, Great Ideas for Teaching Students (G.I.F.T.S)** 2013
National Communication Association
- Top pedagogical activity competitively selected from hundreds of submissions.
- Top Panel, Scholarship of Teaching and Learning** 2008
National Communication Association

COURSES TAUGHT

- Quantitative Methods in Communication Research** 2013 – 2014
Teaching Assistant, Purdue University
4 recitations

Approaches to Interpersonal Communication Instructor/Graduate Lecturer, Purdue University <i>4 sections</i>	2011 – 2013
Approaches to Interpersonal Communication - Online Instructor/Graduate Lecturer, Purdue University <i>5 sections</i>	2011 – 2013
Fundamentals of Speech Communication Instructor/Graduate Lecturer, Purdue University <i>10 sections</i>	2008 – 2012
Teambuilding and Collaboration Instructor/Graduate Lecturer, Purdue University <i>9 recitations</i>	2009 – 2010

DISCIPLINE SERVICE

Ad Hoc Reviewer <i>Interpersonal Communication as Art and Science, Routledge</i>	2014
Ad Hoc Reviewer <i>Interpersonal Communication as Art and Science, Routledge</i>	2011

UNIVERSITY SERVICE

Graduate Student Recruitment Representative for Purdue University National Communication Association Conference, Chicago, IL	2014
Graduate TA Mentor Purdue University <ul style="list-style-type: none"> ▪ Met with new graduate teaching assistants weekly to help improve their teaching skills and performance in the classroom. ▪ Trained TAs to grade according to class standards. ▪ Provided guidance for handling classroom problems and teaching issues. ▪ Observed teaching and provided feedback. 	2014
Panel Respondent Communication Graduate Student Association Conference, Purdue University	2014

- Website Developer** 2013-2014
Purdue University
- Developed a website to assist Brian Lamb School of Communication graduate students on the job market
 - Collected sample job market materials from BLSC alumni including cover letters, research philosophies, teaching philosophies, and CVs
 - Collected sample job interview questions
 - Compiled tips for the job market including handling phone interviews, on campus interviews, and acquiring fellowships
- Graduate Student Recruiter** 2010 – 2014
Purdue University
- Took potential graduate students to events during recruitment weekend
 - Had one-on-one meetings with potential graduate students to inform them about the program
 - Attended several meet-and-greets to actively recruit graduate students
 - Served as a point of contact for incoming graduate students
 - Hosted admitted graduate students at my home
- Graduate Student Recruitment Representative for Purdue University** 2013
National Communication Association Conference, Washington, D.C.
- Graduate Student Representative for Job Candidates** 2011 – 2013
Purdue University
- Attended meet-and-greets to learn more about job candidates
 - Attended job talks, teaching philosophy talks, and information sessions to learn more about the candidates and provide them with information about the program
 - Took candidates out to lunch and dinner
 - Provided assessments of job candidates
- Communication Graduate Student Association Buddy** 2009 – 2012
Purdue University
- Served as a point of contact for incoming graduate students
- Panel Respondent** 2012
Communication Graduate Student Association Conference, Purdue University
- Advisory Committee Member** 2011
Approaches to Interpersonal Communication, Purdue University
- Developed course policies, created assignments, discussed best practices for classroom management

- Independent Study Supervisor** 2011
Purdue University
- Supervised three undergraduates working on research for course credit.
 - Assigned semester schedule and course readings, led discussions regarding mastery of key concepts, led brainstorming sessions for creating methodology to address research questions
- Graduate Student Recruitment Representative for Purdue University** 2010
National Communication Association Conference, San Francisco, CA
- Speech Judge** 2009
Fundamentals of Presentational Speaking, Purdue University

INVITED LECTURES AND INTERVIEWS

- Fedesco, H. N.** (2014, August). Utilizing active learning techniques in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.
- Fedesco, H. N.** (2014, August). How to teach your first two weeks of class. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.
- Fedesco, H. N.** (2014, August). Handling sensitive issues in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.
- Fedesco, H. N.** (2014, April). Lesson on computing t-tests for independent groups. An invited lecture delivered to students in the class Quantitative Methods in Communication Research at Purdue University, West Lafayette, IN.
- Gettings, P., **Fedesco, H. N.**, Pruiim, D. (2014, January). G.I.F.T.S. (Great Ideas for Teaching Students) workshop. Colloquium presented at Purdue University.
- Fedesco, H. N.** (2013, December). Research ethics. An invited lecture delivered to students in the class Quantitative Methods in Communication Research at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2013, August). How to structure class. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2013, August). Utilizing active learning techniques in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2013, August). How to teach your first two weeks of class. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2013, August). Handling sensitive issues in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2013, March). Delivering speeches of introduction. A presentation delivered during a Project Impact meeting at Purdue University, West Lafayette, IN.

Newspaper interview, Hunter, C. (2012, October 24). Encoded message: What does your texting style say about you? *The Exponent*, pp. 1, 5.

Fedesco, H. N. (2012, August). How to structure class. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2012, August). Utilizing active learning techniques in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2012, August). Handling sensitive issues in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

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Fedesco, H. N. (2011, August). Utilizing active learning techniques in the classroom. A presentation delivered during training for new teaching assistants for Fundamentals of Presentational Speaking in the Brian Lamb School of Communication at Purdue University, West Lafayette, IN.

Fedesco, H. N. (2011, March). Moving from undergraduate to graduate school. An invited lecture to students in the class Leading Change in the Organizational Leadership and Supervision department at Purdue University, West Lafayette, IN.

PROFESSIONAL DEVELOPMENT

Mediation and moderation 2-day seminar 2014
Dr. Andrew Hayes, Philadelphia, PA

Student-teacher contact: Building rapport with your students workshop 2014
Center for Instructional Excellence, Purdue University

Encouraging active learning I workshop 2014
Center for Instructional Excellence, Purdue University

Encouraging active learning II: Experiential learning workshop 2014
Center for Instructional Excellence, Purdue University

Instructional presentation techniques that engage students workshop 2014
Center for Instructional Excellence, Purdue University

PROFESSIONAL SOCIETY MEMBERSHIPS

National Communication Association

International Communication Association