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AN EFFECTIVENESS EVALUATION OF MOTIVATIONAL INTERVIEWING AS AN ADDITION TO AN INTERNET-
BASED HEALTH PROMOTION PROGRAM FOR VOCATIONAL REHABILITATION CONSUMERS

By

CASEY NICOLE RUGGIERO

B.A. & B.S., The University of Montana, Missoula, MT, 2003
Master's Degree, The University of Montana, Missoula, MT, 2009

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Approved by:

Sandy Ross, Associate Dean of the Graduate School
Graduate School

Duncan Campbell, Chair
Department of Psychology

Catherine Ipsen
Rural Institute

Tom Seekins
Department of Psychology

Bryan Cochran
Department of Psychology

Christine Fiore
Department of Psychology

Craig Ravesloot
Department of Psychology

Ruggiero, Casey, M.A., Spring 2012

Clinical Psychology

An Effectiveness Evaluation of Motivational Interviewing as an Addition to an Internet-Based Health Promotion Program for Vocational Rehabilitation Consumers

Chairperson: Duncan Campbell

People with disabilities (PWD) frequently experience preventable and/or manageable secondary health conditions such as weight problems, depression, and chronic pain (Jones & Bell, 2003; Seekins, Clay, & Ravesloot, 1994). Importantly, high rates of secondary conditions are correlated with low employment rates in Vocational Rehabilitation (VR) consumers (Ipsen, Seekins, & Ravesloot, 2010; Ipsen, Seekins, & Arnold, 2011). Thus, one pathway to improving employment outcomes in rehabilitation programs may involve enhancing health through the reduction of limiting secondary conditions (Ipsen, 2006; Ipsen et al., 2010). This pilot study tested whether the addition of telephone-based Motivational Interviewing (HPE+MI) to Health Plans for Employment (HPE), an internet-based health promotion and goal setting intervention targeting secondary conditions, resulted in higher self-efficacy beliefs than a factsheets only minimal intervention group or HPE alone. One-hundred and forty-two male and female active VR consumers were randomized to 1 of these 3 intervention groups. Contrary to expectation, no group effects or group \times time interaction effects on targeted specific health behavior self-efficacy, reduction in limitation resulting from secondary conditions, or health related quality of life were observed. A main effect for time was, however, observed for targeted specific health behavior self-efficacy suggesting that participation in both the HPE and the HPE+MI interventions led to higher self reported self-efficacy beliefs on specific targeted health behaviors such as balanced diet, stress management, sleep, and physical activity. Importantly, main effects for time were also observed on measures of secondary condition limitation and health related quality of life suggesting the possibility that all three intervention groups were effective in reducing limitation and enhancing health related quality of life. Of note, program adherence across groups was high, and, contrary to expectation, program adherence did not differ between groups. Study findings suggest that PWD enrolled in VR programs can benefit from health behavior change interventions targeting multiple health behaviors, which are delivered remotely, and that the specific delivery modality (e.g., telephone, interactive website, or emailed factsheets) of health information may be less important than was originally thought. Study implications and future research areas are discussed.

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CHAPTER 1

INTRODUCTION

People with disabilities (PWD) often experience secondary health conditions such as weight problems, depression, and chronic pain. These secondary conditions by definition develop after the onset of an initial or primary disability and may or may not be the direct result of the primary disability (Marge, 1988). High rates of secondary conditions are correlated with unemployment in Vocational Rehabilitation (VR) consumers (Ipsen, Seekins, & Ravesloot, 2010; Ipsen, Seekins, & Arnold, 2011). Health promotion programs have been shown to be effective in reducing these secondary conditions and the limitation associated with them in PWD (Ravesloot, Seekins, Cahill, Lindgren, Nary, & White, 2007; Freidrich, Gittler, Arendasy, & Freidrich, 2005), but many PWD experience significant barriers to accessing these programs such as transportation barriers and lack of adequate health insurance (Ipsen, 2006). The present study aims to explore the potential utility of using VR programs as an avenue for the delivery of a health promotion intervention targeting secondary conditions through positive health behavior change in one of four areas (i.e., diet, exercise, sleep, and stress management). It is thought that a reduction in secondary conditions among VR consumers could ultimately improve overall employability.

The following paper describes a pilot study that tested whether telephone-based motivational interviewing increased PWD's engagement in and adherence to Health Plans for Employment (HPE), an internet-based health promotion and goal setting intervention targeting secondary conditions among VR consumers. Additional outcomes of interest include health behavior self-efficacy beliefs, stage of change, health related quality of life, and limitation from secondary conditions.

Defining Disability

Surprisingly, there is no universally accepted definition of the multidimensional concept of “disability” (Weathers II, 2005). It is defined in a variety of ways that usually have some basis in “functional limitation” or “impairment” depending on the purpose of the designation (i.e., for social security income, rehabilitation services, research, or legal purposes). The Americans with Disabilities Act (ADA) (1990) defines disability as “(A) a physical or mental impairment that substantially limits one or more major life activities of such individual; (B) a record of such an impairment; or (C) being regarded as having such and impairment” (p. 7). To qualify for state-run Vocational Rehabilitation (VR) programs, however, an individual need only be determined to have a “substantial impediment to employment” in at least one of five categories (i.e., sensory impairment, physical impairment, cognitive impairment, mental illness, or substance abuse) (Office of Disability and Employment Policy, n.d., p. 1).

The World Health Organization (2001) takes a much more broad approach to defining disability in the *International Classification of Functioning, Disability and Health* (ICF) that is also rooted in the idea of functional limitation. The ICF definition integrates medical and social models of disability and describes disability as a complex interaction that occurs between personal factors (e.g., physical, emotional and cognitive factors as well as health conditions) and environmental contexts (e.g., social and physical environments that impact disability). Under this definition disability is no longer understood solely in the context of an individual’s health status, but rather in an individual’s functional ability to participate in daily activities given his or her physical and social environment. Thus, in this model, the environment may be constructed in a manner in which an individual with a

health condition might experience no functional limitation or disability. On the other hand, the environment might also create a significant barrier to participation for other individuals.

Regardless of how disability is defined, PWD are a significant minority population in the United States (more than 36 million people) who experience decreased access to education, employment, financial resources, and health promotion services (Altman & Bernstein, 2008; Erickson, Lee, & von Schrader, 2010; Ipsen, 2006; Parker, Woelfel, Hart, & Brown, 2009; Weathers II, 2006). Education levels and employment status have been shown to be significantly lower for PWD than for adults without disabilities. Further, the interaction of current public policy related to PWD (e.g. Americans with Disabilities Act) and public assistance (e.g., Social Security Disability Income, Medicaid, etc.) combined with low levels of education and employment are believed by some to contribute to a “poverty trap” for PWD (Stapleton, O’Day, Livermore, & Imperato, 2006). On average between 2001 and 2005, approximately 20% more people with disabilities fell below 200% of the federal poverty level, than adults without disabilities (Altman & Bernstein, 2008). Notably, socioeconomic status influences the kinds of health care services available to any given individual (Dutta, 2009).

Disability, Secondary Conditions, & Employment

PWD have significantly lower employment rates than people without disabilities (Rehabilitation Research and Training Center on Disability Demographics and Statistics (Altman & Bernstein, 2008; [StatsRRTC], 2006; Weathers II, 2005), and a 2003 American Community Survey found that more than 21 million respondents indicated they had an employment disability (Weathers II, 2005). Survey results also showed that while about

87% of people without a disability had been employed during the past year at some point, only approximately 49% of PWD had been employed during that same time period. People with self-care disabilities, such as being unable to dress or bathe oneself, demonstrated the highest rates of unemployment among PWD, and women, people with low levels of education, and minorities were all also associated with lower levels of employment (Weathers II, 2005).

Ipsen et al. (2010) proposed that employment rates among PWD may be consistently lower than in the general population due to the existence of limiting secondary health conditions. Notably, high rates of secondary conditions are correlated with low employment rates in Vocational Rehabilitation (VR) consumers (Ipsen et al., 2010; Ipsen et al., 2011). Secondary health conditions are generally preventable conditions that occur after the development of a primary disability and include both medical (e.g., pressure sores) and non-medical (e.g., anxiety, depression, fatigue) conditions (Ipsen et al., 2010; Marge, 1988). For example, PWD experience significantly higher rates of obesity compared to adults without disability (Altman & Bernstein, 2008), and this increased prevalence is proposed to stem from a variety of factors that are commonly associated with disability (e.g., inactivity related to physical constraints, increased intake of medications associated with weight gain, etc.). Further, secondary health conditions are defined in Healthy People 2010 as “medical, social, emotional, mental, family, or community problems that a person with a primary disabling condition likely experiences” (U.S. Department of Health and Human Services, 2000, ch. 6 p. 25). The presence of these secondary conditions can make it even more difficult for a PWD to secure and maintain employment (Ipsen, 2006). As a result, health promotion programs targeted at PWD and

the prevention or management of limiting secondary conditions may provide an important opportunity to enhance health and increase employment outcomes in VR settings.

Health Benefits of Employment

It is important to note that employment itself is frequently associated with a variety of positive mental and physical health states, as the benefits associated with gainful employment are numerous and well documented (Dooley, Fielding, & Levi, 1996; Ross & Mirowsky, 1995). The strong relationship between health and employment appears to be largely bi-directional in both men and women. Thus, it appears that people who have better physical health are more likely to be employed (i.e., the selection hypothesis). Similarly, employment appears in itself to have a consistently positive impact or protective effect on both an individual's physical and mental health (e.g., less depression, somatization, and anxiety symptoms as well as higher perceived health) even when relevant demographic factors such as socioeconomic status are controlled statistically (i.e., the causation hypothesis) (Bartley, 1994; Kessler, House, & Turner, 1987; Ross & Mirowsky, 1995; Zabkiewicz, 2010).

Additional research suggests that some unemployed people may have poorer health practices, such as increased substance use, compared to employed individuals, and that experiencing unemployment early in life likely contributes to poorer rated health later in life (Hammarstrom & Janlert, 2002; Janlert, 1997; Kessler et al., 1987). A significant body of research further suggests that re-employment after a period of unemployment is associated with improved health status. This research lends support to the causation hypothesis, which posits that employment itself positively impacts health status (Claussen, 1999).

The positive correlation between health indicators and employment has also been observed among individuals with disabilities. For example, Johnson and colleagues (2004) concluded a literature review by stating that employed individuals with Multiple Sclerosis (MS) reported significantly better health and quality of life on both objective and subjective measures than unemployed individuals with MS. Overall, this growing body of literature regarding health and employment suggests that employment has a positive effect on mental and physical health for individuals with a wide variety of demographic characteristics (e.g., gender, disability status, SES, ethnicity, family structure, etc.) and highlights the key role employment can play in health and health maintenance for PWD.

Health Promotion challenges in the Disability Context

Over the past several years government agencies have begun to direct resources toward identifying healthcare disparities and developing agendas that include health promotion components for PWD. These efforts are reflected in documents such as Disability and Health in the United States 2001-2005 (published by the CDC), Healthy People 2010, the Surgeon General's 2005 Call to Action to Improve the Health and Wellness of Persons with Disabilities, and the 2006 United Nations Convention on the Rights of People with Disabilities (Altman & Bernstein, 2008). Additionally, as we learn more about how health behaviors impact the development and maintenance of secondary conditions, health promotion for PWD is increasingly becoming a research area of interest (Altman & Bernstein, 2008; Jones & Bell, 2003; Ravesloot et al., 2003).

Despite these efforts, PWD continue to experience higher rates of obesity and poorer self-reported health status than people without disabilities in the United States. PWD are also frequently uninsured or underinsured, circumstances which limit their access

to medical care in general as well as to medical specialists and assistive devices (Altman & Bernstein, 2008; Parker, Woelfel, Hart, & Brown, 2009). Further, Ross and colleagues (2006) found that people without health insurance coverage (\approx 46 million people in the United States) (DeNavas-Walt, Proctor, & Smith, 2009), have significantly lower rates of engagement in recommended health prevention programs for cancer, cardiovascular disease, and diabetes management.

Qualitative research has also explored how barriers to healthcare services impact PWD. A recent study by Neri and Kroll (2002) found that many PWD reported experiencing perceived social, psychological, physical, and/or economic consequences related to their limited access to healthcare. For example, an individual's chronic pain resulting from a spinal cord injury may be exacerbated by restricted access to a competent physical therapist who had familiarity with that type of injury. Similarly, another PWD might experience increased financial strain as a result of having developed a need for an expensive medical procedure that resulted from inadequate monitoring of a primary disability. Neri and Kroll further concluded that the constellation of access barriers experienced by PWD varies depending on disability type. This research also suggests that for many PWD a consequence of not having access to adequate healthcare services is increased dependence on others for self-care and routine life tasks, which often results in a decreased ability to live independently. Thus, accessibility to and affordability of health care services for PWD are important factors influencing general health status and psychological well-being. These barriers to access appear to have a greater impact on PWD than people without disabilities because PWD frequently require medical care to manage

their health conditions effectively and prevent the development of limiting secondary conditions (Neri & Kroll, 2002; Parker, et al., 2009).

Targeted Health Promotion for PWD

In recent years several targeted health promotion programs for PWD have begun to emerge such as *Living Well with a Disability* (Ravesloot, Seekins, Cahill, Lindgren, Nary, & White, 2007). *Living Well with a Disability* is a health promotion program developed for people with mobility impairments that aims to help PWD develop and work toward meaningful life goals. A foundational assumption of this program is that health promotion activities can serve as an avenue to reaching meaningful life goals and enhanced quality of life. This program is client-centered and was developed by using participatory action research (PAR) methods that included consumers in the intervention development process. The program is run as a facilitated group that is guided by a workbook. The workbook targets ways to improve both mental and physical health and is composed of 10 chapters including: “goal setting, problem solving, attributional training, depression, communication, information seeking, nutrition, physical activity, advocacy and maintenance” (Ravesloot et al., 2007, p. 524). This program effectively reduces healthcare utilization and limitation due to secondary conditions and decreases the number of unhealthy days experienced (Ravesloot et al, 2007).

Similarly, Friedrich and colleagues (2005) developed a motivational enhancement and exercise-based health promotion program targeting people with chronic low back pain (LBP). The motivational component of the program included keeping an exercise diary, signing a treatment contract, creating individualized reinforcement systems for exercise compliance, rehabilitation and problem solving focused counseling, and information

giving. This program demonstrated long term effectiveness in decreasing perceived level of disability related to LBP, increasing participants' ability to work, and decreasing perceived pain severity.

These as well as other studies targeting health behavior change in PWD have demonstrated that targeted health promotion programs can significantly impact the health of PWD. Ipsen and colleagues (2009) identified several positive outcomes in the literature associated with location-based health promotion programs designed for PWD, including “fewer hospital visits, increased exercise, reduced limitation from secondary conditions, and improved lifestyle behaviors” (p. 2).

Health Promotion & Telecommunication

In response to identified health care access barriers experienced by PWD and in order to maximize cost-effectiveness of health promotion programs, some researchers have used new media and technology innovations to provide alternative means for health communication (Dutta, 2009; Parker et al., 2009). One possible benefit of using telecommunication for the delivery of health promotion interventions may be that it leads to more active consumer engagement and self-care management because consumers are required to participate interactively in order to receive tailored feedback about self-care management strategies. Automated tracking programs may also help consumers stay engaged in their own health care by providing reminders that help consumers monitor their progress (Glueckauf, & Lustria, 2009).

Additionally, internet and telephone based health promotion interventions with expanded reach can provide rural, economically disadvantaged, and other underserved populations, such as PWD, with health information to which they would likely otherwise

not have access. These technologies also provide privacy that many people appreciate when discussing sensitive topics related to their health (Glueckauf, & Lustria, 2009). Further, efficacy and/or effectiveness data are accumulating in support of telephone and internet-based health behavior change interventions for an array of chronic health conditions (e.g., mental health conditions, cardiac conditions, pulmonary disorders, HIV/AIDS, stroke, multiple sclerosis, head injury, and diabetes management) (Glueckauf, & Lustria, 2009).

The demonstrated effectiveness of health promotion programs designed for PWD coupled with the effectiveness of recently developed internet and telephone delivered health promotion programs supports the development of targeted health promotion and self-care management interventions for PWD that are deliverable via telecommunications. Additionally, Lynch and Chiu (2009) suggested that participation and quality of life benefits experienced by PWD as a result of health promotion programs likely justify the difficulties associated with integrating health promotion programs into rehabilitation programs. VR is one example of a rehabilitation program whose consumers would likely benefit from being offered the opportunity to participate in program-related health promotion (Ipsen et al., 2010).

Vocational Rehabilitation, Health Promotion, & Employment

Established by the National Rehabilitation Act of 1973, state operated VR programs aim to help PWDs find and maintain gainful employment (US Department of Education, 2010), and 650,000 consumers across the nation either achieve gainful employment or leave VR services for other reasons each year (RSA, 2006). VR programs offer a variety of services focused on helping individuals prepare for employment such as

assessment and skills training based on the consumer's individual strengths and goals.

According to the Rehabilitation Act of 1973 (as amended, Section 103a), VR services can include any of the following:

Any services described in the individualized plan for employment necessary to assist an individual with a disability in preparing for, securing, retaining, or regaining an employment outcome that is consistent with strengths, resources, priorities, concerns, abilities, capabilities, interests and informed choice of the individual (p. 69).

Given VR's mission and broad range of services offered throughout the United States, it appears to be an ideal system to incorporate health promotion programs for PWD who are uninsured, underinsured and/or lack access to other important health promotion programs (Ipsen et al., 2010). This might be particularly important because many health promotion programs that have been specifically developed for PWD are location-based and/or targeted to a specific disability type (e.g., spinal cord injuries, chronic pain, Down syndrome, etc.) (Block, Skeels, Keys, & Rimmer, 2005; Friedrich, Gittler, Arendasy, & Friedrich, 2005; Heller, Hsieh, & Rimmer, 2004). Thus, even if an individual had the economic means to access these services, it would likely be challenging to locate a health promotion program that is geographically near and targets the right disability type. These types of barriers to health promotion programs for PWD can make access to relevant programs extremely challenging.

Unfortunately, health promotion programs are not currently a central component of national VR programs. However, given that previous research has shown that health promotion programs can reduce limitation associated with secondary conditions (Ravesloot et al., 2007) and that health status is associated with employment (Ross & Mirowsky, 1995), it seems likely that incorporating health promotion programs into VR could positively impact VR's number of successful employment outcomes (Ipsen et al., 2010).

This appears important given that VR outcomes and program effectiveness data are currently solely based on consumer employment status at the time of case closure (Park, Kim-Rupnow, Stodden, & Starbuck, 2005).

Health Related Quality of Life & Rehabilitation Services

Over the years, rehabilitation researchers have highlighted the usefulness of assessing quality of life outcomes in addition to employment outcomes among VR populations (Bishop, Chapin, & Miller, 2008). Some researchers have even suggested that quality of life be one of the primary target outcome variables alongside employment status for rehabilitation programs (Bishop & Fiest-Price, 2001; Roessler, 1990), and it is likely that consumer motivation to engage in rehabilitation services is at least somewhat driven by the belief that life will get better as a result of participation in rehabilitation programs (Rubin, Chan, Bishop, & Miller, 2003). Thus, developing health promotion programs that aim to improve quality of life may be an important step in enhancing VR services.

Additionally, assessing quality of life as an outcome measure for health related rehabilitation programs appears to be an important indicator of program effectiveness. Despite growing consensus that quality of life is an important target, however, there exists much debate in the literature about how specifically to define and measure the construct (Anderson & Bruckhardt, 1999; Bishop, et al., 2008; Bishop & Feist-Price, 2002; Holmes, 2005).

Similarly, health related quality of life (HRQOL) is a more narrowly defined construct that taps into a patient's subjective health experiences. Although firm definitional consensus about HRQOL is lacking, it is generally considered to include both psychological and physical indices (Anderson & Burckhardt, 1999; Andresen & Meyers,

2000; Bishop et al, 2008; Hays, Hahn, & Marshall, 2002; Holmes, 2005). Although some HRQOL measures, such as the commonly-used Short Form (36) Health Survey include both objective and subjective measurements of health, experts in the field have recently emphasized the importance of administering objective measures of health status separately from quality of life measures (Anderson & Burckhardt, 1999; Hays et al., 2002; Holmes, 2005; Powers, 2003). This recommendation stems largely from research showing that objective conditions, such as health status, may influence but do not dictate individual quality of life perceptions (Anderson & Buckhardt, 1999; Hays et al, 2002; Johnson, Amtmann, Yorkston, Klasner, & Kuehn, 2004). For example, an individual might have very poor health status due to chronic illness and still rank their subjective quality of life as good based on other factors such as good mental health, which can be a result of a variety of factors including positive thought patterns and good social support. Further, Johnson and colleagues (2004) concluded that being employed was positively correlated with quality of life indices in a chronically ill population. Thus, this distinction between objective health status and health related quality of life points to the utility of assessing subjective HRQOL in health promotion interventions in order to gain a more holistic understanding of intervention effectiveness on participants' subjective experiences.

In summary, PWD have lower employment rates than PWD, which may be related to functional limitations resulting from secondary conditions. Research has shown that targeted health promotion programs for PWD can reduce limitation experienced from secondary conditions, but that numerous barriers to care make it difficult for PWD to access adequate healthcare programs. Using telecommunication technology to deliver health promotion programs may provide a solution to some access barriers for PWD.

Additionally, providing these programs at a systems level by incorporating health promotion programs into VR services may further reduce access barriers while at the same time minimizing VR consumers' limitation due to secondary conditions and enhancing their employability. Further, several researchers have argued that this shift in VR focus should come in concert with a shift in the measurement of VR outcomes that includes measures of quality of life. In order to develop effective health promotion interventions that meet these requirements it is important to use well developed theories of health behavior change such as the transtheoretical model and Motivational Interviewing to guide intervention design.

Theoretical Framework

Transtheoretical Model

The transtheoretical model (TTM) emerged from Prochaska and colleague's research exploring differences between people that find the motivation to change problem behaviors on their own versus people who seek treatment to help them create behavior changes (Prochaska, Redding, & Evers, 2008b). Through this research, several aspects of a change process emerged as key themes for people who successfully made behavior changes (e.g., recognizing the behavior as negatively effecting one's life, consciously acting to increase the perceived benefits of making the desired change, accessing help from others regarding the desired behavior change, etc.). Prochaska et al. also observed that persons attempted these different change processes in seemingly consistent ways depending on how ready they were to make a given behavior change. Researchers contemplated these findings within the context of numerous existing behavior change theories and then developed the TTM stage of change theory. This theory suggests people

move through predictable stages when attempting to create a variety of behavior changes that include: precontemplation, contemplation, preparation, action and maintenance (Nieuwenhuijsen, Zemper, Miner, & Epstein, 2006; Prochaska, Redding, & Evers, 2008b).

In the earliest stage of change, precontemplation, people have no intent to create a behavior change in their lives, and they are often not aware that their current behavior may be problematic or negatively affecting them. In the contemplation stage of change, people generally have some intent to make a change but not in the immediate future. People who fall into the preparation stage of change intend to make a change in the near future and have demonstrated some movement in the desired direction. In the fourth stage of change, action, people are actively engaged in behavior change, but they have been consistently doing so for only a short period of time. Finally, people who fall in the fifth stage of change, maintenance, have been successfully engaging in the new behavior for more than six months. In the original stage of change model the authors proposed termination as a sixth stage of change (Prochaska et al., 2008b). However, over time this stage appears to have proven less useful, and is not commonly identified as a stage of change in current health behavior change research (Bennet, Young, Nail, Winters-Stone, & Hanson, 2008; Chou, Ditchman, Pruett, Chan, Hunter, 2009; Evers, Prochaska, Johnson, Mauriello, Padula, & Prochaska, 2006; Nieuwenhuijsen et al., 2006).

At the heart of the TTM is the idea that behavior change is a dynamic and complex process that involves multiple different stages of readiness to change. It is rooted in the idea that many people are not ready to engage in behavioral action when they first start contemplating a change. Stage movement appears to be strongly related to the balance of perceived pros and cons as well as other stage processes identified. The theory further

suggests that individuals in different stages of behavior change will respond differently to behavior change interventions (Prochaska et al., 2008b). Thus, interventions tailored to a specific stage of change process are recommended.

In addition to offering a stage of change theory, the TTM emphasizes the role of two other important constructs in behavior change that may facilitate stage movement, decisional balance and self-efficacy. Decisional balance involves recognizing and understanding the pros and cons of implementing a desired behavior change. It also involves understanding the different value and/or levels of importance with which these pros and cons are associated.

Self-efficacy, a construct initially described by Bandura and incorporated into his social cognitive theory (Bandura, 1989), is conceptualized as one's belief in his or her ability to competently perform a behavior even when faced with challenges (Prochaska, et al., 2008b). Self-efficacy is an important construct in the transtheoretical model because the belief that one is able to make a desired behavior change appears to be an important aspect of both considering and implementing a health behavior change in one's life (Bandura, 1997; Diclemente & Velasquez, 2002), and staged-matched health behavior change interventions often focus on supporting self-efficacy beliefs (DiClemente & Velasquez, 2002). Additionally, self-efficacy beliefs have been shown to predict forward stage transition for a variety of health behaviors. For example, research has shown that forward stage transition regarding exercise adoption is predicted by self-efficacy beliefs in adults with and without diabetes as well as in women with multiple sclerosis (de Vet, de Nooijer, de Vries, & Brug, 2005; Levy, Li, Cardinal, & Maddalozzo, 2009; Plotnikoff, Hotz, Birkett, & Courneya, 2001; Plotnikoff, Lippke, Johnson, & Courneya, 2010).

Self-efficacy beliefs have been shown to vary across stages of change for many health behaviors. In numerous dietary studies self-efficacy beliefs appear to steadily increase in a linear fashion, with the highest levels of self-efficacy being consistently associated with later stages of change (Brug, Glanz, & Kok, 1997; Henry, Reimer, Smith, & Reicks, 2006; Ma, Betts, Horacek, Georgiou, White, & Nitzke, 2002; Marcus, Selby, Niaura, & Rossi, 1992). In contrast, in a meta-analytic review of stage of change and applications to physical activity, Marshal and Biddle (2001) found the relationship between self-efficacy and stage of change varied in a nonlinear but consistent and predictable manner across stage transitions. They concluded that although self-efficacy beliefs consistently demonstrated a significant effect at each stage of change, it appeared to play a less influential role on movement between contemplation to preparation stages than it did between precontemplation and contemplation stage transition, and self-efficacy beliefs consistently demonstrated the greatest effect on stage transition between action and maintenance stages. Thus, it appears that self-efficacy can be used as a good predictor of stage transition, but the role it plays in stage transition may vary depending on the target behavior.

Theory suggests that an individual is likely to relapse or move backward into an earlier stage of change at some point during the change process before again moving in the direction of the later stages of behavior change. It is also theorized that people can be at different stages of change for different behaviors (i.e., in precontemplation to engage in exercise, while in maintenance related eating a balanced diet) (Nieuwenhuijsen et al., 2006). Thus, the TTM provides a helpful and empirically supported framework for conceptualizing, researching, and developing health behavior change process interventions

for health behaviors such as diet, exercise, and stress management (Chou et al., 2009; Evers et al., 2006; Prochaska et al., 2008a; Prochaska et al., 2008b; Ronda, Van Assema, & Brug, 2001). Importantly, recent research also suggests that health behavior change stage matched interventions can effectively target multiple health behaviors at one time by facilitating participant exploration of current behaviors and stages of change for multiple health behaviors (e.g., smoking, stress, physical activity, etc.) (Evers, Prochaska, Prochaska, Driskell, Cummins, & Velicer, 2003; Prochaska, Velicer, Redding, Rossi, Goldstein, DePue, et al., 2005; Prochaska, et al., 2008a; Prochaska, et al., 2008b). Given the findings to date, it seems reasonable that the TTM will also provide a helpful framework for change in other, previously-unstudied areas of health behavior such as sleep hygiene.

Finally, research and theory suggest that assessing stage of change in relation to chronic disease management and employment engagement can be helpful in the rehabilitation process by helping professionals more accurately identify and facilitate stage appropriate interventions (Biller, Arnstein, Caudill, Federman, & Guberman, 2000; Franche & Krause, 2002; Nieuwenhuijsen et al., 2006). For example, Biller and colleagues found that using a measure to assess readiness to change related to chronic pain management was a good predictor of patients' level of engagement in a psychotherapy based pain management program. Thus, understanding an individual's readiness to change can guide program referrals.

Motivational Interviewing

MI is also an empirically supported staged matched intervention that is frequently used to facilitate behavior change (Hettema, Steele, & Miller, 2005). MI utilizes a client-

centered and guided interviewing approach. This approach focuses on helping people explore the pros and cons of either employing behavior change or not employing behavior change, while at the same time guiding them toward adoption of the desired behavior. MI is most helpful in early stages and practitioners work to match their responses to clients' reported readiness to change. They also work to help clients generate meaningful arguments for change. Motivational Interviewers encourage people to discuss possible change strategies, which may help them resolve their ambivalence regarding the change (Miller & Rollnick, 2002). Research shows that when MI is used prior to treatment, treatment effects tend to be longer lasting. Research also shows MI often has a positive amplifying or additive effect when it is combined with other treatment modalities (Hettema, Steele, & Miller, 2005; Miller & Rose, 2009).

MI is firmly rooted in the idea that behavior change is a process about which it is common to feel hesitant and ambivalent. Miller and Rollnick (2002) developed MI in order to help raise clients' awareness of potentially harmful behaviors as well as assist them in exploring and understanding their ambivalence and resistance to behavior change in a supportive and non-confrontational manner. MI is considered a client-centered intervention because the motivational interviewer focuses on the client's values and beliefs as well as on eliciting what might be inherently motivating to the client. Thus, one goal of MI is to illicit *change talk*, which Miller and Rollnick (2004) describe as commonly falling into one of four categories: disadvantages of the status quo, advantages of change, optimism for change, and intention to change. Miller and Rollnick have also identified numerous strategies for motivational interviewers to use to both elicit and respond to change talk. For example, an interviewer might use an importance ruler to assess how

important implementing a behavior change might be to a client. As long as the number offered is not 0, then the interviewer can inquire about why that number differed from 0 as well as what things might contribute to them choosing a higher number in the future.

MI is considered to be directional because the motivational interviewer deliberately highlights, magnifies and reinforces change talk differently than he or she responds to resistance or arguments by the client to maintain the status quo. These differences in responding are used to help move the client in the direction of positive behavior change (Miller & Rollnick, 2002). The MI process is separated into two phases. The first phase of MI focuses on helping clients become aware of harmful behaviors as well as on increasing their motivation to change these behaviors. The second phase is focused on creating a plan for behavior change and increasing commitment to implementing the plan. This second phase often involves some sort of goal setting process (Miller & Rollnick, 2002).

Collaboration, *evocation*, and *autonomy* represent three central components that form the foundation of MI or the ‘spirit’ of MI. *Collaboration* suggests the client and the interviewer work together to explore the client’s motivation to change. The interviewer establishes themselves as a fellow explorer rather than an expert and strives to create an open and positive environment that is conducive to change. *Evocation* is used to elicit a client’s own motivation or reasons for change that can then be further explored and expanded upon by the client and interviewer working together. Finally, *autonomy* in MI means that the client always decides if he or she wants to stay engaged in the process, and it is made clear that clients are entirely responsible for what, how, when and if they create a behavior change in their lives (Miller & Rollnick, 2002).

Miller and Rollnick (2002) also describe four guiding principles of MI that include *expressing empathy, developing discrepancy, rolling with resistance, and supporting self-efficacy*. *Expressing empathy* can be conceptualized as careful listening in a nonjudgmental manner to a client while seeking to understand how the person views the world. The interviewer can then reflect back to the client that he or she understands and accepts where the client currently is in the change process. Providing empathy also involves acknowledging that ambivalence is an expected part of a normal change process.

Developing discrepancy is a more directive MI approach in which the interviewer facilitates a discussion about how one's values and goals align (or do not align) with current behaviors. This approach highlights the importance of helping clients identifying and clarifying values throughout the MI process. The interviewer then helps develop and amplify perceived discrepancies between values and behaviors in a manner that ultimately helps the client move in the direction of behavior change (Miller & Rollnick, 2002).

Rolling with Resistance is characterized by respecting the client and not engaging in an argument in favor of change. When resistance to change is encountered it indicates the interviewer needs to alter his or her approach to prevent the client from arguing in favor of the status quo. The interviewer may choose to offer a new perspective for consideration but remains open to the client adopting or not adopting this new way of thinking (Miller & Rollnick, 2002).

Finally, *supporting self-efficacy* helps clients believe that they are capable of creating the behavior change they desire. This can be done in a variety of ways such as reflecting client strengths, reviewing past successes, as well as engaging in problem solving discussions (Miller & Rollnick, 2002).

Transtheoretical Model & MI Working Together

Although the TTM and MI were developed independently, the theoretical underpinnings of the two models are similar in many ways, and they are often used together to create and test health behavior change interventions. The following section will briefly discuss how Diclemente and Velasquez (2002) conceptualize matching MI processes with the various tasks associated with each stage of change.

MI can be successfully used in the precontemplation stage to help clients' explore their values and their resistance to health behavior change in an accepting, supportive, and nonjudgmental environment. Reflective listening, empathy, providing feedback, acknowledging a variety of options, reframing, decisional balance, double-sided reflections and offering affirmations are among the many methods that have been identified as useful MI approaches during this stage. Additionally, it is especially important during the precontemplation stage for the interviewer to remain open and nonconfrontational as well as to avoid educating the client about what behavior changes they *should* make (DiClemente & Velasquez, 2002).

During the contemplation stage, MI can be used to help the client explore the pros and cons associated with the desired behavior change. Because neither the pros nor cons clearly outweigh the other in this stage, it is especially important for the interviewer to focus on moving the client toward behavior change by reflecting back and emphasizing the person's own arguments for change, while also supporting autonomy. It is also helpful during this stage to discuss past attempts at the behavior change and what might be done differently to avoid the same outcome in the future. MI in the contemplation stage is focused on developing one's belief that change is possible. It is also helpful to give clients

some feedback about how the problem behavior might be affecting different aspects of their lives. One way this might be done is by reflecting back perceived limitations or reported secondary conditions and facilitating a discussion about how the behavior in question might be negatively impacting these conditions (DiClemente & Velasquez, 2002).

During the preparation stage, MI helps individuals develop and commit to a realistic plan of action regarding the behavior change. In this stage, the interviewer evaluates how strongly the client is committed to implementing the desired change. Thus, thoroughly exploring possible barriers to change and strategies to overcome those barriers is an important part of the interview. During this stage, the motivational interviewer might offer an array of possible strategies for change, offer ideas related to what often works for other people, or give concerned feedback when the client begins to move toward implementing unrealistic or potentially futile change strategies (DiClemente & Velasquez, 2002).

Clients may need extra support in the action stage to help them work through unanticipated barriers and deal with the change related stressors. The motivational interviewer can use reflective listening strategies that amplify the pros associated with the behavior change. Additionally, motivational interviewers often play a key role in helping clients increase their perceived self-efficacy by acknowledging and reflecting back the steps the client has successfully made toward his or her desired behavior change. They can also ask open-ended questions that require the client to focus and elaborate on how he or she has succeeded thus far in the change process (DiClemente & Velasquez, 2002).

Relapse is not considered uncommon in the TTM and, thus, MI is considered by some to be a helpful intervention even in the final stage of change. The motivational

interviewer can play an important role in the maintenance stage by helping clients reframe threatening barriers to behavior maintenance, reflect on previous successes as well as what they have learned about overcoming obstacles in the process. Motivational interviewers can also facilitate renewed commitment to the change process by encouraging the client to review the reasons why they have decided to make the behavior change (DiClemente & Velasquez, 2002). However, there is some evidence that MI may be less helpful in the later stages of change (Hettema et al., 2005).

Empirical support for MI & Health Behavior Change

Although MI was first applied to substance abuse, it has demonstrated effectiveness in increasing peoples' intrinsic motivation for and commitment to change across a variety of health behaviors (e.g., physical activity changes, dietary changes, changes in diabetes management, dental hygiene changes, etc.) (Chou et al., 2009; Hettema et al., 2005; Linden, Butterworth, & Prochaska, 2010; Martins & McNeil, 2009). Importantly, MI has also been shown to be effective in relatively small doses (Hettema et al., 2005). Martin and McNeal's (2009) review of health behavior change interventions concluded that more than three-fourths of studies that included two MI sessions lasting at least one hour demonstrated an effect. A significant effect was evident on such varied behaviors as oral health, exercise, and diabetes management. In a separate meta-analysis of 72 clinical trials, Hettema and colleagues (2005) concluded that the average MI intervention time was just slightly over two hours with several studies demonstrating effectiveness in even smaller doses. Indeed, the shortest effective MI session reviewed was 15 minutes (Rubank et al., 2005).

Emerging evidence also suggests that MI can be an effective strategy for targeting multiple health behavior changes during the same intervention (Campbell, Carr, DeVellis, Switer, Biddle, Amamoo et al., 2009; Linden et al., 2010; Prochaska, 2008; van Keulen et al., 2008). For example, Prochaska and colleagues (2008) tested three levels of a health promotion intervention that included (1) a health risk appraisal with minimal stage of change feedback only (HRI), (2) an HRI plus an interactive tailored online intervention (3) HRI plus MI. The MI intervention was telephone-based and included three contacts that all lasted less than one hour. Each level of the employee health promotion program targeted four different health risk behaviors including: physical activity, stress levels, smoking, and body mass index (BMI). Results showed that both the online intervention group and the MI intervention group reported significantly lower numbers of health risk behaviors at six-month follow-up as compared to the HRI only group. Additionally, there was a significant difference on stage related goal criteria met for physical activity and stress between these two groups as compared to the HRI only group at six-month follow up. Thus, at least in the short term (no long term results were reported) an HRI and brief telephone-based MI intervention targeting multiple health risk behaviors were shown to be effective in helping participants create stress and exercise related behavior changes. There were no statistically significant differences, however, between the online and the MI groups at follow-up.

In addition to having empirical support as a stand-alone treatment, MI also has demonstrated effectiveness at increasing patient adherence to other interventions, which combined have led to positive health behavior change outcomes. (Burke, Dunn, Atkins, & Phelps, 2004; Hettema et al., 2005; Martins & McNeal, 2009; Miller & Rose, 2009; Rubank, Sandvoek, Lauritzen, & Christenson, 2005; Zweben & Zuckoff, 2002). For

example, Connors, Walitzer, and Derman (2002) found that participants who received a single MI session before entering an alcohol treatment program had higher treatment adherents rates and higher rates of abstinence, as well as less “heavy drinking days” than did program participants who received role induction counseling (i.e. were given information about the components and process of alcohol treatment) or no preparatory meeting.

Similarly, a pilot study exploring the comparative effectiveness of adding MI to a established weight management intervention targeting diet and exercise behaviors for women with non-insulin dependent diabetes mellitus found that treatment attendance and participation was significantly better for women in the MI plus weight management intervention than for the weight management intervention alone. After treatment ended, women who had received the additional MI also demonstrated significantly better glucose control than did women who received only the behavioral intervention (Smith, Heckemeyer, Kratt, & Mason, 1997). The positive correlation observed between MI and treatment adherence in the above studies is important because individual’s who participate and engage in treatment appear more likely to meet their treatment goals than individuals who do not fully adhere to interventions (Zuckoff & Zweben, 2002). These data also suggest that the addition of MI to health promotion interventions may be one way to improve treatment adherence, which has been identified as a major problem in chronic illness management (Glueckauf & Lustria, 2009; Zweben & Zuckoff, 2002).

MI & Self-Efficacy Beliefs

In addition to improving adherence to other treatments, MI has consistently demonstrated medium to large effect sizes on dependent variables such as stage of change

and self-efficacy beliefs for a broad range of health behaviors (Chou et al., 2009; Hettema et al., 2005; Miller & Rose, 2009). For example, a pilot study that combined MI with a solution-focused intervention found that participants between the ages of 11 and 17 who experienced difficulty managing their Type 1 diabetes significantly improved glycemic control post intervention (Viner, Christie, Taylor, & Hey, 2003). Notably, the control group did not demonstrate improved glycemic control or enhanced self-efficacy beliefs. Viner and colleagues concluded that the significant increase in self-efficacy beliefs for diabetes management likely contributed to the interventions effectiveness in changing health behaviors (i.e., improved diabetes management).

It is not surprising that MI-based interventions consistently demonstrate positive effects on health behavior self-efficacy beliefs, because a central task of MI is to support them (Miller & Rollnick, 2002). As described above, these beliefs about oneself and one's capabilities play an important role in when and how individuals choose to make behavior changes and what these changes represent (Bandura, 1997; van der Bijl & Shortridge-Baggett, 2001). For example, health specific self-efficacy beliefs have been repeatedly shown to predict a variety of positive health behaviors (Bernier & Avard, 1986; McAuley, 1993; Rimmal, 2001; van Ryn, Lytle, & Kirscht, 1996), and individuals with strong beliefs about their ability to perform a certain health behavior tend to participate in desired behaviors at a higher rate. They also continue to attempt to master these challenging behaviors even when barriers arise more often than do individuals with low perceived self-efficacy (Bandura, 1997; Bandura & Cervone, 1983; Maibach & Murphy, 1995; Rimmal, 2001). Because self-efficacy beliefs have been consistently associated with health behavior change, they can serve as an intervening proximal outcome variable, which provides

important information about the potential utility of new interventions. These proximal outcome variables become particularly important to examine in pilot studies that may be statistically underpowered or too short in timeframe to detect actual behavior changes (Bennet et al., 2008; Viner et al., 2003).

Telephone Delivered MI

Telephone-based MI has also been shown in a few studies to be an effective health behavior change intervention, and it has specific utility for rural people who experience transportation or other access barriers to health care (Bennet, Young, Nail, Winters-Stone, & Hanson, 2008; Miller & Rose, 2009). It also offers an alternative to location-dependent health promotion workshops, the most prevalent delivery mechanism for existing programs targeting PWD (Lorig, Ritter, & Plant, 2005; Raveslout, Seekins, & White, 2005).

Moreover, telephone-based health promotion MI has demonstrated effectiveness in small doses (Miller & Rose, 2009), which makes it a relatively cost-effective intervention strategy. Despite the potential utility of providing MI via telephone, little research exists on the effectiveness of telephone-based MI health promotion interventions, with a 2005 review identifying only three studies of this delivery modality for behavior change (Hettema et al., 2005).

In the past five years, however, studies have begun to emerge reporting positive effects for health behavior change telephone-delivered MI based interventions (Ang, Kesavalu, Lydon, Lane, & Bigatti, 2007; Bennet et al., 2008; Campbell et al., 2009; Linden et al., 2010; Prochaska, 2008a). Specifically, Prochaska and colleagues (2008a) concluded that a relatively brief telephone MI intervention (one 30-45 minute call & 2 10-15 minute calls) effectively moved participants into the action stage of change in at least

two of three targeted problematic health behaviors (i.e., exercise engagement, stress reduction, smoking cessation) in a group of employees who reported various stages of change at baseline. Similarly, Campbell and colleagues (2009) showed that telephone delivered MI (four 20-minute calls) combined with tailored newsletters sent via email was effective in increasing fruit and vegetable consumption in a group of cancer survivors.

Only two studies appear to report on a telephone delivered MI intervention specifically targeting health behavior change in a population that experiences chronic illness (Ang et al., 2007; Linden et al., 2010). Linden and colleagues (2010) found that a telephone-delivered MI intervention averaging 3 sessions (one 30-40 minutes and approximately two 10-20 minute sessions) effectively enhanced perceived self-efficacy, perceived health status, and patient activation in a chronically ill participant group enrolled in an employee wellness program. Similarly, Ang and colleagues (2007) demonstrated that in population of women with fibromyalgia a telephone delivered MI intervention (consisting of six phone calls averaging about 25 minutes) delivered in conjunction with two exercise consultations effectively increased exercise and reduced self-reported pain and physical impairment.

MI Fidelity & Training Issues

Despite the growing literature supporting the use of MI, fidelity to MI principles is an important issue to consider when exploring the effectiveness of MI-based interventions. Several prominent MI researchers have recently criticized poor treatment integrity and fidelity in studies that report using MI, and they have called on researchers to clearly report on MI training and integrity of MI sessions using Motivational Interviewing Treatment Integrity (MITI) coding or a Motivational Interviewing Skill Code (MISC) (Hettema et al.,

2005; Martins & McNeil, 2009; Miller & Rose, 2009). Although this is a relatively new development, it promises to add to the scientific understanding of MI and to facilitate researchers' efforts at MI intervention development and research reliability.

Summary

PWD are at risk for developing secondary health conditions that can reduce their ability to participate in meaningful life activities including finding and maintaining employment. Concurrently, employment confers a variety of health and other benefits beyond financial gain and has the potential to mitigate development or exacerbation of secondary conditions such as depression. Research and theory highlighting both the usefulness and importance of health promotion programs and interventions to help PWD avoid and/or manage limiting secondary conditions continues to develop. However, PWD often face numerous barriers to health promotion program participation. Few programs focusing specifically on reducing the impact of secondary conditions have been developed, and those that have are frequently disability specific and geographically-based—requiring a client's physical presence at a particular clinic or program facility. Additional common barriers to health care for PWD include limited access to or availability of employee-based health promotion programs, limited health insurance coverage, environmental access barriers, and functional limitation associated with secondary conditions.

Access barriers to health promotion programs designed for PWD leave many PWD with few options for getting help identifying and implementing potentially helpful health behavior changes. The research reviewed above suggests that MI (delivered face-to-face or via telephone) is an effective intervention strategy for facilitating a wide variety of health behavior changes in both people with and without disabilities, and that MI is most effective

in facilitating health behavior change when it is used with people in the early stages of change (i.e., precontemplation or contemplation stages) (Hettema, et al., 2005). A growing body of literature also suggests that telehealth and online interventions can be effective modalities for delivering health promotion interventions (Murray, Burns, See Tai, Lai, & Nazareth, 2009; Glueckauf & Lustria, 2009; Prochaska et al, 2008; Irvine, Ary, Grove, & Gilfillan-Morton, 2004). Importantly, internet and telephone health promotion interventions have the potential to provide rural, economically disadvantaged, uninsured and other underserved populations with health information to which they would likely not have access otherwise. However, participant engagement in such programs is often reported as low, and additional telehealth research is needed that targets vulnerable populations such as PWD living in rural areas (Glueckauf & Lustria, 2009; Iezzoni, Killeen, & O'Day, 2006).

Prochaska and colleagues (2008) recently demonstrated that both an MI and an online health promotion intervention (each targeting multiple health behavior changes) were effective in helping participants in an employee health program attain forward stage transition in more than one health behavior. To our knowledge, however, no studies have looked at the utility of combining telephone-delivered MI with an online health promotion intervention targeting multiple health behaviors in a population of PWD. The present study tested whether MI delivered by telephone to PWD enhanced health behavior self-efficacy beliefs as well as treatment engagement in an online health promotion intervention that targets multiple health behaviors (i.e., diet, stress management, sleep, and physical activity). By providing telephone and web-based interventions through state run VR

programs, we hope to reduce the number of healthcare access barriers commonly experienced by PWD.

The present study included VR participants who were randomly assigned to one of three intervention groups, including a factsheets only group, an internet-based Health Plans to Employment (HPE) group, and a combined intervention group employing both Motivational Interviewing and HPE (HPE+MI). In the information only condition, participants were emailed factsheets that addressed the link between many common secondary conditions and four health behaviors (i.e., diet, stress management, sleep, and physical activity). The information provided about these four target behaviors on the factsheets was identical to the content provided about these four behaviors on the interactive HPE Website. Participants in the internet-based HPE condition (HPE online) participated in an interactive health promotion and health behavior change goal setting program. Finally, participants in the MI condition (HPE+MI) were encouraged to complete the online HPE program and they also received two brief telephone-based MI encounters. It is important to note that, although the HPE+MI participants were encouraged to participate in the HPE online program, in maintaining the spirit of MI they were also explicitly told that HPE participation was entirely up to them. Participation in the two MI sessions as well as the goal setting and monitoring processes via the internet-based HPE program were monitored.

This pilot study aimed to test whether brief telephone-delivered MI assisted VR consumers in learning to make links between meaningful life goals, such as employment, and one's mental and physical health through a health promotion intervention that includes MI above and beyond an online health intervention or factsheets alone. Both the HPE and

the HPE+MI interventions emphasized the roles that thought and behavior patterns play in the development and maintenance of secondary conditions in PWD. We anticipated that MI would be particularly effective in the present study given that the target sample of VR consumers were primarily unemployed PWD who were not specifically seeking health treatments and, thus, likely in the early stages of health behavior change.

Hypotheses:

1. At post-treatment, health behavior self-efficacy beliefs will be significantly higher in the HPE+MI group than in the other two intervention groups.
2. At post treatment, health related quality of life beliefs (as measured by the CDC-HRQOL's Unhealthy Days Score, Activity Limitation single item, and Summary Score) would be significantly lower in the HPE+MI group than both other intervention groups. Additionally, post treatment quality of life beliefs (as measured by the BRFFS Quality of Life single item) were expected to be significantly higher in the HPE+MI group than both other intervention groups.
3. At post treatment, proportionally more HPE+MI participants will report having attained at least one forward stage shift on any of four target behaviors (i.e., diet, stress management, sleep, and physical activity) than the other two treatment groups.
4. At post treatment, HPE+MI participants will report experiencing less limitation (as measured by the SSCI) as a result of secondary conditions than participants in the other two intervention groups.
5. Participants in the HPE+MI group will evidence higher HPE intervention adherence than participants in the HPE only intervention group.

CHAPTER 2

Methods

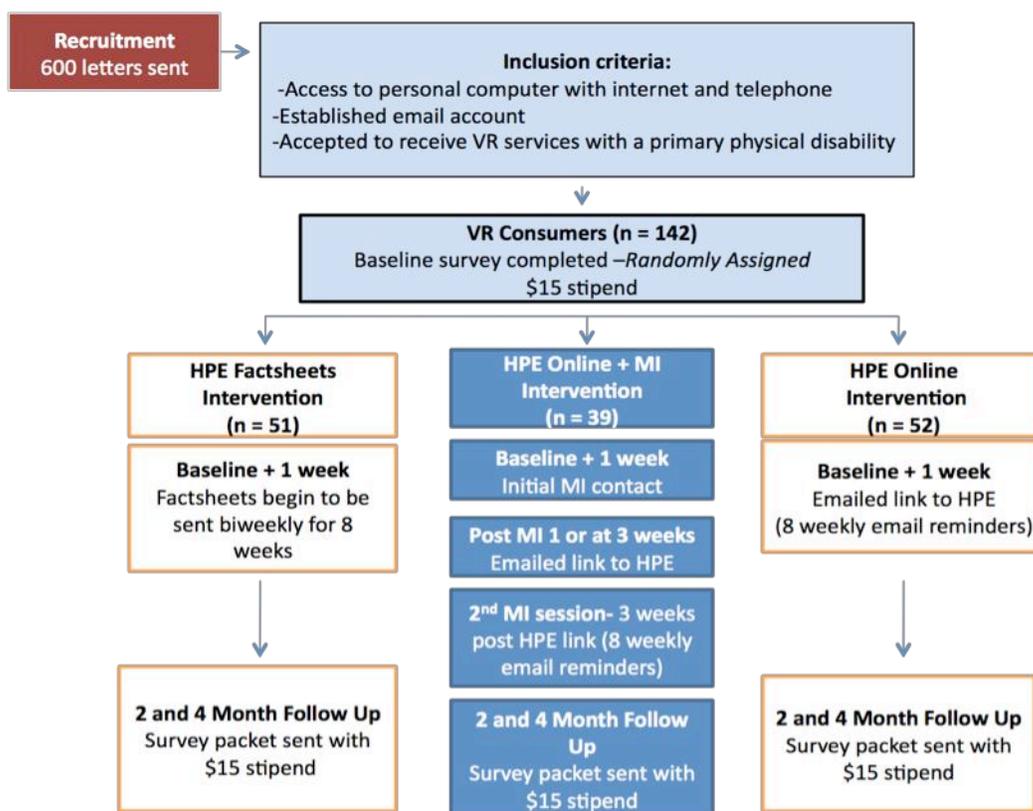
Design and Setting:

The present study employed MI in conjunction with Health Plans for Employment (HPE), an internet-based health promotion program developed for VR consumers. To test the comparative effectiveness of the interventions, VR consumers from Washington State were recruited and randomly assigned to one of three health promotion conditions. As shown in Figure 1, these interventions included: (1) A series of emailed health promotion factsheets (HPE factsheets); (2) an interactive internet-based health promotion and goal setting intervention (HPE online); or (3) a telephone-based motivational interviewing intervention designed to facilitate engagement in HPE online (HPE+MI). HPE+MI is the focus of this research paper, and it is represented as the blue-shaded middle column in Figure 1.

HPE online included three stages. First, participants completed a brief assessment of limitation from secondary health conditions via the interactive HPE website. Based on individual responses, participants were provided health behavior change information in up to four domains including: diet, stress management, sleep, and physical activity. Finally, participants were asked to set a behavior change goal in one health behavior domain. Participants who submitted a goal via the website received automatic weekly email reminders to log back onto the website and update his or her goal for the next eight weeks. For participant convenience these reminder emails included a direct link back to the participants HPE goal setting web-page. These email goal reminders were used to assess the participants' progress toward their health behavior change goal. As shown in Figure 1, participants assigned to the HPE+MI group completed the HPE online program and were

also asked to participate in two telephone-delivered MI sessions during the first month of the intervention. Follow up surveys were sent at two and four months from participant completion of the baseline survey (see Figure 1). We hypothesized that the MI intervention would increase engagement in HPE online as well as magnify the long term benefits of the intervention.

Figure 1: Participant Flow Chart



The study employed a mixed experimental design, with a single three level between-subjects treatment factor (Factsheets, HPE, HPE+MI) and a single within-subjects factor of time (baseline, 2-month follow-up, and 4-month follow-up). As described below, multiple comparisons were made using 3 (treatment) x 3 (time) Repeated Measures ANOVAs.

Participants:

All 142 participants were VR consumers from the state of Washington, which has an active Center for Disease Control (CDC) Disability and Health program. Permission was granted to use VR programs for this study by the VR Council of State Administrators (CSAVR) in 2008, and Washington VR administrators agreed to participate in the study in 2010. Eligible participants were men and women between 21 and 64 years old who reported having personal access to a phone, a computer with internet access, and an established email address during the recruitment/screening process described below. Eighteen to 20-year-olds were excluded from the present study because these individuals often have access to different support systems that focus specifically on the transition youth population.

Measures:

Outcome variables included health behavior self-efficacy, health behavior stage of change, HRQOL, functional limitation resulting from secondary conditions, and HPE program adherence. Additionally, participants completed a general demographic questionnaire at baseline that included questions related to healthcare insurance coverage, employment status, and type of disability and impairment (see Appendix A). All analyses employed an intent-to-treat approach, and descriptive data such as treatment intensity (e.g., skipped MI sessions) was monitored in order to provide potentially useful information about possible alternative explanations for study findings.

Self-Efficacy:

The Self-Efficacy for Managing Chronic Disease 6-Item Scale (MCD6) assessed general health promoting behavior self-efficacy beliefs (Stanford Patient Education

Research Center, 2001). Questions on this measure are posed in terms of confidence levels, with each question using the same response scale that ranges from 1 (not at all confident) to 10 (totally confident). The possible range of total scores is 6-60; higher scores reflect higher perceived self-efficacy for engaging in general health promoting behaviors (Stanford Patient Education Research Center, 2001). Due to the brevity of the MCD6, scales with missing data were not included in reported analyses.

The Self-Efficacy for Managing Chronic Disease 6-Item Scale is a shortened version of a psychometrically sound set of chronic disease self-efficacy scales that was developed by the Stanford Education Center for a chronic disease self-management study. This 6-item version has demonstrated good internal consistency reliability (Stanford Patient Education Research Center, 2006). Of note, the measure also evidenced good internal consistency reliability in the present study with a Cronbach's alpha of .85. Although the parent self-efficacy scales have demonstrated adequate validity (Lorig, et al., 1996), no validity data are available for the 6-item measure. This shortened measure assesses how confident one is in his or her ability to deal with common health related problems and is routinely used for patient care at the Stanford Education Research Center (<http://patienteducation.stanford.edu/research/secd32.html>).

Modified confidence rulers (Miller & Rollnick, 2002) that addressed each of the four intervention areas (i.e., diet, stress management, sleep, and physical activity) were administered. These rulers assessed how confident a participant was on a scale from zero (not confident) to 10 (very confident) that he/she could make a positive health behavior change in each target area (e.g., "How confident are you that you can maintain a balanced diet?"). A Confidence Ruler mean representing total confidence across behaviors was also

created by summing across participants' Confidence Ruler ratings for each of the four target behaviors (i.e., diet, stress management, sleep, and physical activity). Conceptually these different groups of health behavior confidence fit well together and internal consistency was high (Cronbach's $\alpha = .79$). No data were imputed for the confidence rulers when data points were missing, and instead, participants with missing data were dropped from analyses.

Stage of Change:

The TTM identifies five general stages of readiness to change, and because behavior change stages may differ depending on the target behavior (Prochaska, Redding, & Evers, 2008), participant stage of change was assessed by a single question for each of the four target behavioral areas (i.e., diet, stress management, sleep, and physical activity). Each question provided a brief definition of the target behavior that was followed by a 5-choice response format representing each of the five stages of change. The definitions and response format were based on previously used stage of change questions from several studies (Evers et al., 2006; Nigg et al., 1999; Prochaska et al., 2008; Sarkin, 2001; Velicer, Prochaska, Fava, Norman, & Redding, 1998). As no question assessing sleep hygiene was available, the stage of change question for this target behavior was written following previously used questions.

A summary forward movement count variable was created that represented the number of targeted behavior domains (i.e., diet, stress management, sleep, and physical activity) for which forward stage shifts were reported. Two additional binary variables were also created that collapsed reported forward stage shifts across the four target behaviors and represented any forward shift on any of the target behaviors between

baseline and 2-month follow up as well as between baseline and 4- month follow-up. Finally, a forward shift count variable was also created that represented the number of domains for which at least one forward change shift was reported. This variable ranged from 0 (no forward shifts reported) to 4 (forward shifts reported on all four target behaviors). No data were imputed for stage of change questions when participants had missing data. Thus, if data were missing at any of the time points required for an analysis, the participant was dropped from the analysis.

Quality of Life:

Two subscales from the Center for Disease Control's (CDC: CDC, 2002) 14-item measure assessed HRQOL. These subscales include the "Healthy Days Core Module" (four questions) and the "Healthy Days Symptom Module" (five questions). These modules have been used extensively over the past decade in major surveys such as the state-based Behavioral Risk Factor Surveillance System (BRFSS), the National Health and Nutrition Examination Survey, and the Medicare Health Outcome Survey (Center for Disease Control and Prevention, 2010). The first item in the Healthy Days Core Module asks participants to rate their general health on a 5-point Likert scale ranging from "excellent" to "poor" and is the first question on the popularly used SF-36 (Center for Disease Control and Prevention, 2005; Power, 2003; RAND Health, 2009). The remaining three items in this module as well as all the items in the Healthy Days Symptom Module ask participants to indicate the number of days (in the past 30 days) that they have experienced a wide variety of symptoms associated with poor mental health, poor physical health and/or activity limitation. Scores on these items range from 0-30. For the present study, in order to reduce potential confusion resulting from a fill-in-the-blank response

format, participants circled the number of days they experienced symptoms or activity limitation on a 2 day interval scale (i.e., 2 days, 4 days, 6 days, etc).

On eight of these nine items, lower scores are associated with good perceived quality of life, and scores of 14 or more days have traditionally been treated as a cut-off for “substantial level of impairment” (Center for Disease Control, 2010). The remaining item assesses how frequently the participant has felt “very healthy and full of energy.” As a result, higher scores on this item suggest good perceived health related quality of life.

Additionally, an unhealthy days summary score was calculated by combining item #2 (i.e., reported physical unhealthy days) and #3 (i.e., reported mental unhealthy days) from the Healthy Days Core Module to create a summary score of total unhealthy days reported in a month. For example, if a participant reported 6 days in which her physical health was not good and 10 days in which her mental health was not good, her unhealthy days summary score would be 16. The maximum number of unhealthy days a participant can attain is 30 (Mielenz et al., 2006). Thus, if a participant reported 20 days in which her physical health was not good and 30 days in which her mental health was not good, the participant would be reported as having an unhealthy days summary score of 30.

In addition, a CDC-HRQOL summary score consisting of four quality of life indicator questions targeting pain, sleep, sadness, and worry was also created. These four health related quality of life questions fit together well conceptually and internal consistency was acceptable (Cronbach’s alpha = .76).

In previous research these HRQOL modules have demonstrated acceptable psychometric properties, including moderate to excellent test-retest reliability among adults with a disability and community samples (Andresen, Catlin, Wyrwich, Jackson-

Thompson, 2003; Nanda & Andresen, 1998). These HRQOL modules have also demonstrated good construct validity (Hennessy, Moriarty, Zack, Scherr, & Brackbill, 1994; Mielenz, Jackson, Currey, DeVellis, & Callahan, 2006; Nanda & Andreson, 1998). Additionally, quality of life was assessed using a single face valid quality of life item from the BRFSS (Center for Disease Control, 2002), which asked “Overall how would you rate your quality of life?” The question response format includes a 10 point Likert scale, with response options ranging from 0 = “worst possible” to 10 = “best possible.” No data were imputed for HRQOL questions. Thus, if data were missing at any of the time points required for a particular analysis, the participant was dropped from that particular analysis.

Secondary Conditions:

Finally, the Secondary Conditions Surveillance Instrument (SCSI) assessed the amount of time participants are limited by secondary conditions (Seekins, Smith, McCleary, & Walsh, 1990). Respondents rated the functional impact of 32 potential secondary conditions; each secondary condition was presented with a label (e.g., “depression”) and a brief description. The SCSI’s total score across secondary conditions provided a global measure of the individual’s level of limitation due to secondary conditions. The SCSI has evidenced good validity and reliability (Seekins, Clay, & Ravesloot, 1994; Whiteneck, Charlifue, Gerhart, Overholser, & Richardson, 1992). A mean imputation strategy in which the total item mean was substituted for up to two missing data points on the SSCI was employed. If more than two data points on the SSCI were missing, the participant was dropped from the secondary condition analyses.

HPE Treatment Adherence:

A secondary aim of this study was to explore differences in treatment adherence between the HPE online and the HPE+MI groups. Participant adherence was assessed by monitoring whether or not participants set a behavior change goal online as well as by tracking the number of times participants logged back onto the HPE website and updated his or her action plan via the weekly email reminders. Finally, treatment intensity data were collected regarding whether or not participants in the HPE+MI group completed both MI telephone calls.

Procedures:

Recruitment Procedures

Results of a power analysis conducted with Sample Power 2 software suggested that 40 participants per group would yield sufficient power (.93 with a 95% confidence level) to detect a small to medium effect similar to self efficacy effects reported in the MI health promotion literature (e.g., Hettema, et al., 2005; Bennett, et al., 2008). This power analysis also suggested that 75% participation in the HPE+MI intervention would yield sufficient power for a pilot study (i.e., .84 with a 95% confidence level).

Due to exclusion criteria, we over recruited participants in hopes of getting 120 participants who were willing to participate in the study and also met inclusion criteria. In total, 142 VR consumers meeting inclusion criteria volunteered to participate in the present study. Upon receipt of a participant's baseline survey, he or she was randomized to one of the three health promotion interventions including: (1) HPE factsheets; (2) HPE online; or (3) HPE+MI. For every three surveys received in the mail, one was randomly assigned to each of the three groups. Due to our limited number of motivational interviewers, after 40

participants had been randomly assigned to HPE+MI, the remainder of the participants was randomized only to groups one and two.

VR personnel in Washington sent recruitment letters with screening postcards to 600 randomly selected VR consumers with a primary physical disability. Consumers were asked to complete and return the postcard if they were interested in participating in an internet-based health promotion program and had easy access to a computer with Internet as well as an established email address. We oversampled based on past research with VR counselors, who estimated that approximately 60% of consumers have computer and internet access (Ipsen, Rigles, Arnold, & Seekins, in press). Researchers had no identifying information about individual VR consumers recruited until they returned the pre-paid postcard to the study coordinators. Participants also provided contact information and best times to be reached by telephone. If consumers returned a postcard, indicated that they wanted to participate in the study, and met study inclusion criteria (as determined by postcard responses), a baseline survey and informed consent were sent via standard mail.

One-hundred and forty-two Washington state VR consumers expressed an interest in participating in the study, met study inclusion criteria, and returned baseline survey packets. All returned baseline packets with signed consent forms were collected, date stamped, assigned a participant number, and randomly assigned to one of the three intervention groups the Friday of the week they were received. Welcome letters were also sent on this Friday to all participants explaining their group assignment and what they could expect to happen next. A copy of the informed consent and a \$15 stipend for completing the baseline survey were also included in this letter. Emails were also sent to all reported participant email addresses during this time to ensure that each participant

could be contacted via email. If a participant did not respond to this email check a follow-up call was made to initiate contact.

HPE+MI Intervention Protocol:

Initial calls to schedule the first MI session were made between seven and 10 days from baseline (i.e., the Friday of the week that completed consent forms and baseline packets were received) in order to give participants time to receive their group assignments and welcome letter in the mail. During the initial scheduling call, if no one answered, a voice message was left explaining the purpose of the call and asking the participant to call back for scheduling. A follow-up email was sent two or three days later, if a call back had not yet been received. If there was still no response, two more calls were made in an attempt to schedule the first MI session. No messages were left at these times if the participant was unavailable. During the fourth and final contact call by the interviewer, an additional message was left requesting a call back if the participant had not yet been reached. Thus, up to four telephone calls and one email contact were made in an attempt to schedule an interview time with a participant. Of note, 36 of 39 initial MI calls were successfully completed (92%). Thus, only three participants did not complete the initial MI call. Calls were scheduled during the work day or evenings as well as on weekends to accommodate as many participants as possible. If no contact was made or if the participant did not follow through with the initial interview within two weeks, the initial MI call was abandoned and documented in notes. If the initial MI call was not completed, which was the case for three participants, the internet-based HPE link was not emailed at the end of the call. In these cases, the HPE link was sent to the participant three weeks from baseline.

Prior to the initial MI call, the motivational interviewer reviewed information from the baseline questionnaires that described the participant's disability, level of perceived limitation, and stage of readiness to change on the four study target behaviors (i.e., diet, stress management, sleep, and physical activity). This information was used to help guide the MI intervention. The initial MI session focused on exploring participants' beliefs about how their current health behaviors (i.e., diet, physical activity, stress management, and sleep habits) were impacting their lives and contributing to their limiting conditions. The initial call also focused on identifying a specific target behavior for discussion. Finally, the initial MI session explored how the participants' health behaviors differed from their health values and beliefs. Topics of discussion varied widely depending on the health behaviors the participant chose. During the session, MI principles were used to explore each participant's current level of motivation to make a health behavior change.

Participants who completed the initial MI session, which averaged 35 minutes in length, were emailed the internet-based HPE link immediately following the first call. An automatic email was then sent to the motivational interviewer any time an MI group participant set a health behavior change goal online or updated his/her progress online via the automated eight weekly email goal reminders. A letter outlining the logon procedures was also sent to the participant via standard mail, if a participant had not logged onto the HPE website within a week of being emailed the HPE website link. One additional reminder call to logon to the HPE website was also made to participants in the HPE online group, because participants in this group were not receiving any other phone contact.

At the end of the first MI session, the motivational interviewers attempted to schedule the second MI interview for three weeks following the first. Reminder calls were

made to each participant who scheduled the second MI session a few days in advanced of the scheduled follow-up call. Some participants with uncertain schedules did not advance schedule the second MI call. In these cases, the scheduling protocol outlined for the initial MI call was employed. In all cases, the second MI interview was scheduled to occur approximately three weeks after the HPE link was sent regardless of whether or not the participant had set a health behavior goal online. Notably, 30 of 39 of HPE+MI participants completed both MI calls (77%).

The motivational interviewer reviewed each participant's goals set via the online HPE intervention prior to completing the second MI session. These sessions averaged about 35 minutes in length as well. If the participant had set a goal online, his or her descriptions of values, motivations for change and perceived barriers outlined during the goal setting process were discussed. MI principles were used to explore and reinforce each participant's motivation to take identified steps toward achieving his/her health behavior change goal. If a goal had not been set online, but the participant had participated in the initial MI session, the second MI session continued exploring the consequences of current health behavior patterns as well as exploring a participant's motivation for change. If a goal had not been set and the participant had not participated in the initial MI call, which was the case for one participant in the present study, an adapted protocol for the initial MI session was used at time two.

In total 66 out of 78 attempted calls were successfully completed (85%) and 37 of 39 participants completed at least one MI call. Additionally, 70% of HPE+MI participants set a behavior change goal online. All MI telephone calls were audio recorded. Typed notes were also kept for every completed MI call, which included process notes (e.g.,

attempts to contact, difficult phone connections, etc.) and notes regarding the call (i.e., content of interview, stage of change, target behaviors discussed, motivation to change, limitations discussed, etc.). All MI audio recordings and session notes were encrypted and saved on a USB key in a locked closet. As discussed in detail below, 15% of the audio recorded sessions were randomly selected and coded by a certified MITI coder in order to confirm MI treatment fidelity.

Participants from all three intervention groups were sent paper and pencil follow-up survey packets by standard mail to complete and return at two and four months from baseline. A program evaluation survey was also included in the two month follow-up survey packet. Reminder postcards were also sent one week post survey mailing. Upon receipt of each completed survey packet, participants received a \$15 stipend.

The MI protocols for this study were modified from van Keulen and colleagues' (2008) telephone delivered MI protocol, which was originally based on MI protocols developed by Resnicow and colleagues (2002) during the Healthy Body Healthy Spirit study. As intended by the authors, the protocol was used flexibly as a tool to guide each interview, and each interview varied depending on the client's identified target behavior, level of motivation, and current stage of change. The following protocol outline was used to assist the motivational interviewer in guiding each MI session. (See Appendices B and C for detailed MI Protocols).

MI Protocol (Session 1)

1. The interviewer introduced herself, built rapport, and reviewed limits of confidentiality.
2. The interviewer summarized and confirmed the participant's perceived limitations.

3. The interviewer used foundational MI principles to explore how current health behaviors related to diet, physical activity, sleep and stress management might be impacting the development/maintenance of limiting secondary conditions. The participant guided this discussion and determined what health behaviors were explored.
4. The interviewer used a readiness ruler exercise to assess participant readiness to change his/her target behavior and used MI to target the patient's current stage of change.
5. The interviewer worked to enhance motivation and self-efficacy beliefs related to behavior change with a variety of MI approaches.
6. The interviewer summarized the interview and asked for feedback. The interviewer also reflected on the participant's readiness for HPE online.
7. The interviewer attempted to schedule the next MI session and closed the session.

During the second MI session, the motivational interviewer had access to the participant's health behavior change goal, if the participant had in fact created an action plan online during the internet portion of the intervention. The client's descriptions of values, motivations for change and perceived barriers outlined during the goal setting process were used to help the interviewer guide the session. MI principles were employed to explore and reinforce each participant's motivation to take identified steps toward achieving his/her health behavior change goal. The interviewers also had access to several index cards with core MI skills outlined on them that could be used as prompters for specific MI skills during an interview.

If the participant did not participate in the initial MI session or the internet based HPE program, the MI session completed at time two largely followed the MI session 1

protocol. The following protocol was used when a participant had at a minimum set a goal online or completed the initial MI session.

MI Protocol (Session 2)

1. The interviewer again built rapport and reviewed limits of confidentiality.
2. The interviewer summarized the participant's health behavior change goal (or previous MI session) and explored what led him/her to set that particular goal.
3. The interviewer worked to assess participant values and beliefs by exploring the importance of making the proposed behavior change.
4. The interviewer used MI principles to explore how the participant's behaviors (related to his/her health goal/target area) might be impacting the development and maintenance of limiting secondary conditions as well as how he/she might want to change these behaviors.
5. The interviewer assessed readiness to change and used appropriate MI skills to explore lack of interest or ambivalence. For those in later stages of change, the interviewer guided the participant in brainstorming possible actions, exploring barriers, and facilitating commitment to change.
6. The interviewer assessed participant confidence in his/her ability to make the desired change. The interviewer asked permission before offering additional problem solving strategies or suggestions.
7. The interviewer summarized the interview and asked for feedback as well as reviewed the next step in the intervention process.

Motivational Interviewer Training

The motivational interviewers were both 5th year clinical psychology doctoral students who had participated in an intensive 2-day MI workshop presented by

Motivational Interviewing Network of Trainers (MINT). They both also completed five (hour-long) two-on-one MI-focused supervision sessions prior to the intervention.

Additionally, prior to working with study participants, both interviewers were rated by a certified coder on each of the five global dimensions (i.e., evocation, collaboration, autonomy, empathy, and direction) of the Motivational Interviewing Treatment Integrity scale (MITI). Both interviewers were coded in a score range associated with competency at that time (Moyers, Martin, Manuel, Miller, & Ernst, 2010).

To facilitate determination of MI treatment fidelity during the intervention, 15% of the audio recorded sessions (10 calls) were randomly selected (half from MI session 1 and half from MI session 2) and coded by a certified MITI coder. Importantly, MITI global score average ratings across the 10 randomly selected calls suggested that the Motivational Interviewers in the present study were MI adherent (i.e., Evocation (4.6), Collaboration (4.5), Autonomy (4.7), Empathy (4.4), and Direction (4.7)).

CHAPTER 3

Results

Sample Demographics

Table 1 presents demographic characteristics for the total sample and separately for the participants in each treatment group. As presented in the table, there were no significant differences reported at baseline between treatment groups on gender, age, ethnicity, health insurance coverage, levels of education, disability type, secondary conditions, self-efficacy beliefs, or number of unhealthy days. More women (56.3%) than men participated in the study overall and average participant age was 46 years old (SD=12.1). The majority of the sample identified their ethnicity as Caucasian (83.8%), and almost 89% reported some education beyond high school. The majority of the sample was unemployed (63.4%) and uninsured (78.2%).

Inclusion criteria required all participants to have a primary physical disability (as determined by Vocational Rehabilitation Services). A significant number of participants also endorsed having a cognitive disability (20.6%), a mental health disability (31.7%), and/or a sensory disability (16.2%). Attrition was minimal, with 82.4% of the total sample completing and returning all three surveys (baseline, 2-month and 4-month follow-ups). Importantly, attrition did not differ across intervention groups, and no significant differences between completers and noncompleters were identified on demographic variables, disability status, or other baseline illness indicators such as reported limitation from secondary conditions and number of unhealthy days experienced. All analyses described below included participants who completed and returned surveys at all time points. Thus, all repeated measures mixed ANOVAs, which analyzed data across time,

were conducted on smaller group n's that reflect attrition. For example, nine of 39 HPE+MI participants did not return surveys from all three time points. As a result, analyses employing repeated measures generally only included 30 HPE+MI participants.

Table 1. Sample Characteristics (n = 142)

Demographic & Participant characteristics	Factsheet n=51	HPE n=52	HPE+MI n=39	Total n=142	P- value
Gender n (%)					ns
Women	29 (57.0)	26 (50.0)	25 (64.0)	80 (56.3)	
Age: Mean (sd)	46 (12.9)	45.7 (11.9)	46 (11.5)	45.9 (12.1)	ns
Ethnicity: n (%)					ns
Caucasian	44 (86.3)	44 (85.0)	31 (79.5)	119 (84.4)	
Minority	7 (13.7)	7 (13.5)	8 (20.5)	22 (15.6)	
Disability Groups: n (%)					
Cognitive Disability	11 (21.6)	12 (23.1)	6 (15.8)	29 (20.6)	ns
Mental Health Disability	16 (31.4)	15 (28.8)	14 (35.9)	45 (31.7)	ns
Sensory Disability	11 (21.6)	8 (15.4)	4 (10.3)	23 (16.2)	ns
No Insurance	40 (78.4)	40 (76.9)	31 (79.5)	111 (78.2)	ns
Education level, Some college minimum: n (%)	43 (84.0)	48 (92.3)	35 (89.7)	126 (88.7)	
Secondary Conditions (SSCI): mean (sd)	25 (12.2)	24.8 (13.9)	28 (13.9)	25.7 (13.2)	ns
Self Efficacy (MCD6): mean (sd)	37 (12.7)	32.8 (11.5)	35.1 (15.3)	35.1 (13.0)	ns
Unhealthy Days (CDC- HRQOL): mean (sd)	20.5 (11.4)	19.1 (10.8)	21.5 (11.8)	20.2 (11.2)	ns

Attrition Rates: n (%)	5 (9.8)	11 (21.2)	9 (23.1)	25 (17.6)	ns
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Note. HPE = Health Plans to Employment group; HPE+MI = Health Plans to Employment plus Motivational Interviewing group; SSCI=Sum of Secondary Conditions Instrument, MCD6 = Managing Chronic Disease 6-item scale, CDC HRQOL = Center for Disease Controls Health Related Quality of Life; p = p-value (.05) for tests of group differences (factsheet v. HPE v. HPE+MI); χ^2 statistics examined group differences for categorical variables, and univariate ANOVAs were used to examine group differences for continuous data.

Effects of treatment group on self-efficacy

As proposed a 3 (Factsheets, HPE, & HPE+MI) \times 3 (baseline, 2-month, & 4-month follow-up) repeated measures mixed Analysis of Variance (ANOVA) analyzed differences between intervention groups on general health related self-efficacy beliefs, as measured by the MCD6, across time. The ANOVA examined the main effects of treatment and time, as well as the treatment \times time interaction. Table 2 below presents the results for all repeated measures ANOVAs. Contrary to hypotheses, no significant effects were observed.

Participants who received HPE+MI did not report significantly higher mean scores on general health related self-efficacy beliefs, as measured by the Self-Efficacy for Managing Chronic Disease 6-item scale (MCD6), than participants who received Factsheets or HPE only. No main effects for treatment group or time were observed. The treatment \times time interaction was similarly nonsignificant.

Table 2. Repeated Measures ANOVA Table for Health Behavior Change Study

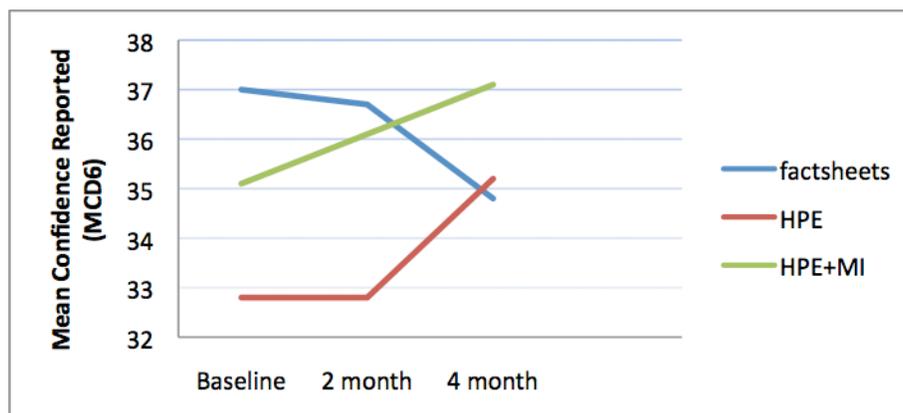
	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial Eta Squared</i>
Self-efficacy (MCD6)				
Group	2	.60	.55	.011
Time	2	.31	.73	.003
Group*Time	4	1.84	.12	.032
Self-efficacy (target confidence rulers)				
Group	1	.27	.61	.005
Time	2	3.06	.05*	.055
Group*Time	2	1.53	.22	.028

Self-efficacy (confidence rulers sum)				
Group	2	.13	.88	.002
Time	2	.17	.84	.002
Group*Time	4	1.01	.40	.017
HRQOL (unhealthy days)				
Group	2	.08	.92	.001
Time	2	4.93	.008**	.042
Group*Time	4	1.24	.30	.022
HRQOL (activity limitation)				
Group	2	.30	.74	.005
Time	2	5.78	.004**	.049
Group*Time	4	.93	.45	.016
HRQOL (summary score)				
Group	2	.30	.74	.005
Time	2	5.07	.007**	.043
Group*Time	4	.55	.70	.010
HRQOL (BRFFS single item)				
Group	2	.22	.80	.004
Time	2	.87	.42	.008
Group*Time	4	.16	.96	.003
Secondary Condition Limitation (SCSI)				
Group	2	.70	.50	.013
Time	2	4.32	.014*	.038
Group*Time	4	.44	.78	.008

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

Despite these nonsignificant effects, the estimated marginal means from the MCD6 repeated measures mixed ANOVA were plotted in order to illustrate trends in the data that the analyses may have been underpowered to detect. These plots are presented in Figure 2 and suggest that the HPE and HPE+MI groups experienced higher health related self-efficacy beliefs over time, while the factsheet group evidenced a decrease in health-related self-efficacy over time.

Figure 2: Mean Confidence Reported (MCD6)



As proposed a 2 (HPE & HPE+MI) \times 3 (baseline, 2-month, & 4-month follow-up) repeated measures mixed ANOVA analyzed differences between intervention groups on self-confidence beliefs related to the participants' target behaviors. Participant target behaviors were identified in his or her behavior goal and were measured by behavior-specific Confidence Rulers across time. As a result, in the present analysis only one of four confidence questions was analyzed for each participant depending on the area (i.e., diet, stress management, sleep, or physical activity) in which the participant set a goal. Thus, only participants who set a goal were included in this analysis. The model employing the target Confidence Ruler as the dependent variable demonstrated a significant main effect for time, which suggested that target confidence significantly increased across intervention groups over time. Follow-up contrasts suggested that the time effect was driven by increases in confidence that emerged between baseline and 2 month follow up ($F(1, 53) = 5.4$ $p = .024$, partial $\eta^2 = .09$). Contrary to hypotheses, neither the main effect for intervention group nor the intervention group \times time interaction was significant. Please see Table 2 for repeated measure ANOVA results.

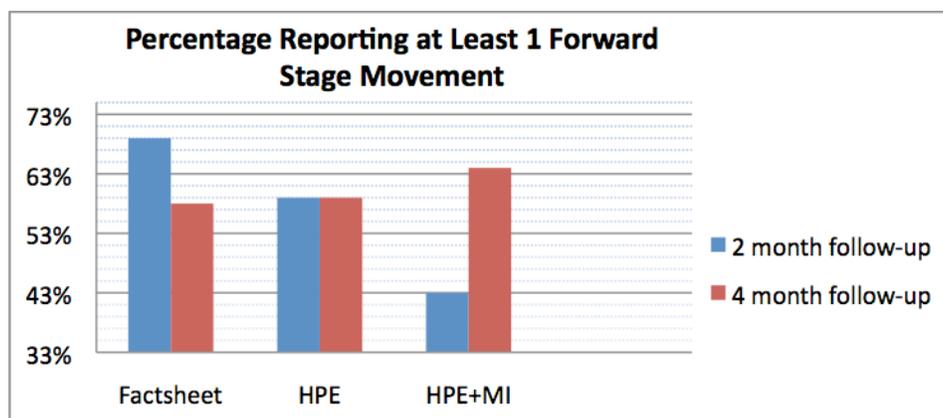
A 3 (Factsheets, HPE, & HPE+MI) \times 3 (baseline, 2-month, & 4-month follow-up) repeated measures mixed ANOVA analyzed differences between intervention groups on participant total confidence across time. Please see Table 2 for repeated measure ANOVA results. Contrary to the hypothesis that the HPE+MI group would show a greater endorsement of self-confidence across time, results demonstrated a nonsignificant main effect for intervention group and for time. Further inspection also revealed a nonsignificant intervention group \times time interaction effect.

Effects of interventions on stages of change

Contrary to expectation, high proportions of participants entered the study reporting advanced stages of change readiness, including the action or maintenance stage (i.e., 70% on stress management, 65% on balanced diet, 46% on regular physical activity, & 61% on sleep hygiene), which may have constrained reported forward stage movement over time. Differences between intervention group participants on stage of change forward movement were tested using two chi-square analyses. These analyses compared the proportions of participants in each intervention group that experienced at least one forward stage movement on at least one target variable (i.e., diet, stress management, sleep, and physical activity) at 2 month follow-up and 4 month follow up. Sixty-six percent (n=114) of participants who completed all stage measures at all three time points reported making at least one forward stage movement between baseline and 4-month follow-up. The chi-square analyses demonstrated that, contrary to hypotheses, the proportions of participants who made at least one forward stage movement did not differ significantly across intervention groups between baseline and two month follow-up ($\chi^2(2) = .4.93, p = .09$) or baseline and four and four month follow up ($\chi^2(2) = .34, p = .85$).

Although no statistically significant differences on forward stage movement were identified between groups, these chi square analyses (see Figure 3) suggest that at two month follow-up proportionally more factsheet participants reported making a forward stage shift than either of the other two intervention groups. Interestingly, at 4 month follow-up proportionally more HPE+MI participants reported at least one forward stage movement than the other two intervention groups. More specifically, 64% of HPE+MI participants reported at least one forward stage movement as compared to 59% of the HPE only group participants and 58% of factsheet only group participants at four month follow-up.

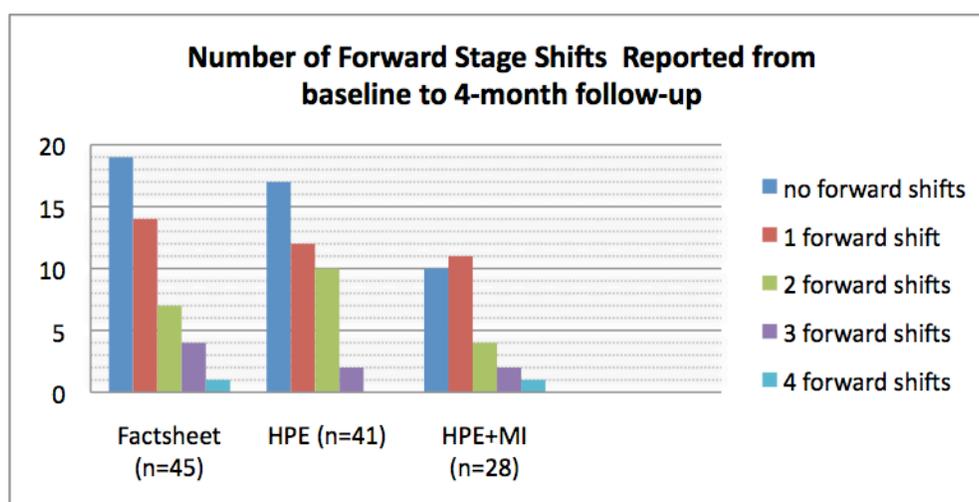
Figure 3.



A nonparametric Kruskal-Wallis test explored differences between intervention groups on a forward count variable, which represented the number of target behaviors for which each participant reported at least one forward stage shift. For example, if a participant reported forward stage movement in stress management and forward stage movement in physical activity, his or her forward count score would be two. Contrary to our hypothesis, results revealed no statistically significant differences between groups in terms of number of forward stage shifts reported on the four target behaviors at four month

follow-up $H(2)=.105$, $P= ns.$. The following bar graph representing these results, however, suggests that there were some distribution differences between groups. As seen in figure 4, the HPE+MI group is the only group at 4-month follow-up in which participants endorsed having made ‘1 forward shift,’ more frequently than they endorsed having made ‘no forward shifts.’ In contrast, both the factsheets group and the HPE online group endorsed having made no forward stage shifts at a higher rate than they endorsed any other forward stage shift category.

Figure 4.



Effects of interventions on quality of life

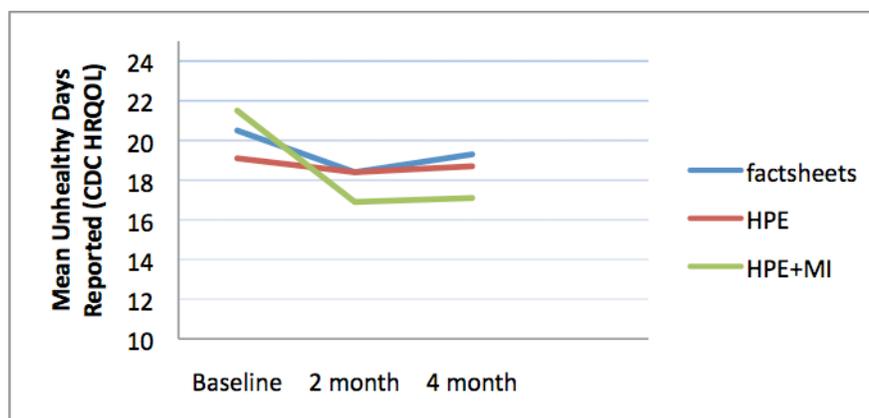
Four separate 3 (Factsheets, HPE, & HPE+MI) \times 3 (baseline, 2-month, & 4-month follow-up) repeated measures mixed ANOVAs analyzed differences between intervention groups on HRQOL beliefs (as measured by the CDC-HRQOL Unhealthy Days Score, CDC-HRQOL summary score, CDC-HRQOL Activity Limitation single item, and the BRFSS Quality of Life single item) across time. Please see Table 2 for analysis results.

A significant main effect was identified for time on the Unhealthy Days summary score, which indicated that participants’ reported number of unhealthy days decreased over

time. Follow-up contrasts confirmed that the main effect for time was driven by decreases in self-reported unhealthy days that emerged between baseline and 2 month follow up ($F(1, 112) = 8.56$ $p = .004$, partial $\eta^2 = .07$). In contrast to hypothesized results, the main effect for intervention group was not significant nor was the intervention group \times time interaction.

Although no significant main effects for group were identified, Figure 5 illustrates trends in the data that the analysis may have been underpowered to detect. Specifically, the HPE+MI group reported greater reduction in unhealthy days than the other two intervention groups.

Figure 5. Mean Unhealthy Days Reported (CDC-HRQOL)



The ANOVA for the single item Activity Limitation scale also demonstrated a significant main effect for time. This indicated that participants reported less activity limitation over time across groups. Again, in contrast to our expectations, a significant main effect for intervention group was not observed nor was a significant intervention group \times time interaction.

A significant main effect for time was also identified on the CDC-HRQOL summary score, indicating that participants reported improved quality of life over time.

Contrary to hypotheses, the main effect for treatment group and the time x treatment group interaction were both nonsignificant.

Finally, nonsignificant main effects were identified for time and intervention group on the BRFSS quality of life single item. In contrast to hypothesized results, a nonsignificant time × intervention group interaction effect was also identified.

Effects of interventions on secondary conditions

A 3 (Factsheets, HPE, & HPE+MI) × 3 (baseline, 2-month, & 4-month follow-up) repeated measures mixed Analysis of Variance (ANOVA) analyzed differences between intervention groups on limitations resulting from secondary conditions (as measured by the SCSJ) across time. As shown in Table 2, analyses revealed a main effect for time on secondary conditions, suggesting that self-reported limitation resulting from secondary conditions decreased over time. Contrary to proposed hypotheses, a nonsignificant main effect for intervention group and a nonsignificant time x group interaction effect were also identified.

Effects of interventions on adherence

Independent samples t-tests explored differences in group means between the two active intervention groups (HPE & HPE+MI) on treatment adherence indicators. Contrary to hypotheses, no significant differences were observed between groups on number of goals set ($t(89) = .13, p = .89$) or the mean number of times participants in each group logged back on to the website through their email reminders ($t(88.92) = 1.61, p = .11$). These findings suggested that program adherence did not significantly differ between the HPE and the HPE+MI groups, when adherence was defined as number of goals set and number of logons. On average, HPE group participants logged back on to the HPE websites about

2 times. In contrast, HPE+MI group participants averaged about 1.2 logons via the email reminders. Despite the absence of significant group differences, overall treatment adherence rates were high across groups. For example, nearly 73% of the HPE and HPE+MI group participants set goals online, and about 47% logged back on to update their progress at least once, with several participants logging on for the maximum eight times. About 59% of participants who set goals did so in the physical activity domain, while 20% focused on stress reduction. Moreover, 17% focused on sleep quality, and only 5% set a diet related goal.

Program Evaluation Data

Program evaluation data were collected after program completion to inform potential changes to the intervention protocols. Eighty-eight participants (62% of total) completed and returned evaluations. Of these persons, 57% of factsheet group participants, 58% of HPE online participants, and 68% of HPE+MI participants reported completing steps toward goals two months post intervention. About 59% of participants in the HPE and HPE+MI groups rated the email reminders as helpful and approximately 84% reported that they would recommend the program to others. Eighty-eight percent of HPE+MI participants who completed the program evaluation rated the MI calls as helpful. Sixty-seven percent of HPE+MI responders rated the call length 'just right', while 17% indicated that they were 'too long', and 13% described them as 'too short.' Of those who did not complete the phone calls, participants reported barriers related to time constraints and scheduling difficulties. Among the participants who reported never logging on to the HPE online program, lack of participation was attributed to limited or no internet access, trouble understanding logon procedures, lack of logon information, and lack of interest.

CHAPTER 4

Discussion

Numerous studies have shown that PWD are at risk for developing secondary health conditions that can reduce their ability to participate in meaningful life activities including finding and maintaining employment. To our knowledge, this is the first study to explore the utility of combining telephone-delivered MI with an online health promotion intervention targeting multiple health behaviors among PWD. Given that previous research and theory highlight the importance of health promotion programs that reduce healthcare access barriers for PWD, it seems important to explore the potential utility of alternative methods of delivering health promotion services. Previous research also suggests that MI facilitates a variety of health behavior changes in people with and without disabilities, and it is most effective in facilitating health behavior change when it is used with people in the early stages of change (Hettema, et al., 2005). A growing body of literature further suggests that telehealth and online modalities can effectively deliver health promotion interventions (Murray, Burns, See Tai, Lai, & Nazareth, 2009; Glueckauf & Lustria, 2009; Prochaska et al, 2008; Irvine, Ary, Grove, & Gilfillan-Morton, 2004).

The present pilot study employed a mixed experimental design, with a single three level between-subjects treatment factor (Factsheets, HPE, HPE+MI) and a single within-subjects factor of time to explore the relative effectiveness of using telephone based Motivational Interviewing as an addition to the newly developed HPE internet based program. One-hundred and forty-two participants recruited from Washington state VR programs volunteered to participate in this health promotion program and were randomly assigned to one of three treatment intervention groups. At two and four months post

intervention, participants completed a number of self-report questionnaires assessing their self-efficacy beliefs and stage of change regarding particular health promoting behaviors. Health related quality of life, limitation from secondary health conditions, and treatment adherence were also assessed.

Experimental Findings

Self-efficacy beliefs

Our primary hypothesis stated our expectation to find a significant group \times time interaction effect for each of our three self-efficacy analyses. More specifically, we predicted self-efficacy beliefs (as measured by the MCD6 and behavior specific confidence rulers) would evidence a greater increase over time in the HPE+MI group than in the other intervention groups. These expectations were not supported for any of the self-efficacy analyses.

The lack of observable main or interaction effects on general health related self-efficacy beliefs measured by the MCD6 may be a result of assessing the wrong outcome variable entirely. In other words, more general health related self-efficacy beliefs assessed by the MCD6 may not be affected by the present health behavior change interventions. It seems possible that this more general measure of health behavior self-efficacy may not have picked up on more behavior specific self efficacy belief changes targeted in both the HPE online and the HPE+MI interventions. For example, a participant's health behavior change goal might have been related to walking more frequently. Thus, the participant's self-efficacy for engaging in walking behavior might have increased over time, but it may not have generalized to an extent that this shift in walking confidence would have been reflected in a more general health-related self-efficacy measure such as the MCD6. This

argument is further supported by the fact that some increase in self-efficacy beliefs in the HPE online and HPE+MI groups were observed on more behavior specific confidence rulers that reflected participant's specific goal areas.

Another possible reason for our lack of observed interaction effects across self-efficacy analyses is that this pilot study may have been underpowered to detect differences between groups. Observed power calculated in the repeated measures ANOVA employing the MCD6 was .1 for time, .15 for group, and .55 for time \times group interaction, which provides some evidence supporting this possibility. Despite nonsignificant interaction effects, graphs generated of group means from the MCD6 self-efficacy analysis suggest that potentially important trends emerged in the data that the statistical analyses may have been underpowered to detect. More specifically, graphs suggest that over time both the HPE and the HPE+MI group means, associated with general health-related self efficacy, raised about two points while the factsheets group mean fell about two points over the same period of time. Although, it is possible that significant effects reflecting higher reported self-efficacy beliefs for the two interactive interventions may be detectable in a larger sample over time, it is important to note that a four point difference on a 60 point scale may be too small of a shift to reflect meaningful changes in participant self-efficacy beliefs.

In the self-efficacy analysis that examined confidence rulers (on targeted health behaviors) as the dependent variable, a significant effect was observed for time but not for group or the time \times group interaction. The observed main effect for time on target confidence indicates that both the HPE and the HPE+MI groups reported an increase in specific self-efficacy beliefs related to the goal each participant previously set online.

Thus, although more general health self-efficacy may not have been affected by the present treatment interventions (as measured by a confidence ruler mean and the MCD6), more behavior-specific self-efficacy beliefs, as measured by health behavior specific confidence rulers associated with participant goals, did appear to be impacted positively. Further analyses suggested that these effects emerged within the first two months post intervention. Of note, the demonstrated effect size for time was relatively small, which is not entirely inconsistent with previous research. Hettema and colleagues (2005) reported effect sizes in one meta-analysis of 72 clinical trials employing MI interventions targeting health behavior change ranging from small to large.

This identified increase in behavior specific self-efficacy beliefs across groups is a potentially important finding, because previous research has demonstrated that health specific self-efficacy beliefs predict a variety of positive health behaviors (Bernier & Avard, 1986; McAuley, 1993; Rimmal, 2001; van Ryn, Lytle, & Kirscht, 1996). Further, individuals with strong beliefs about his or her ability to perform a certain health behavior tend to participate in these behaviors at a higher rate over time. For example, Rimmal (2001) found that strong exercise self-efficacy beliefs were positively correlated with exercise behaviors in a longitudinal study including almost 1000 adult participants. Further, Rimmal concluded that when participants who had reported low perceived exercise self-efficacy at baseline demonstrated increases in exercise specific self-efficacy beliefs, their exercise behaviors also increased. Previous research also suggests that persons with high self-efficacy continue to attempt to engage in challenging behaviors even when barriers arise more often than do individuals with low perceived self-efficacy (Bandura, 1997; Bandura & Cervone, 1983; Maibach & Murphy, 1995; Rimmal, 2001).

Thus, our finding of a main effect for time on targeted self-efficacy beliefs may be an indicator that the present health promotion interventions might also be associated with actual behavior changes over time.

As noted previously, the present study was designed as a pilot study. As such, the recruited sample size was small and attrition reduced these already small group sizes. Thus, the lack of hypothesized interaction effects on target confidence may also be a reflection of this study's limited power. Many analyses, including the target confidence analysis described above, employed subgroups of participants (e.g., only those participants who set a goal online and completed questionnaires from all three time points). As a result, the sample size for the target confidence analysis was only 55 participants, and it is possible that in a larger study treatment effects associated with MI interventions and behavior specific self efficacy beliefs demonstrated in previous research could be observed between groups (Hettema et al., 2005; Burke et al., 2004). Observed power calculated in the repeated measures ANOVA for target confidence in the present study was .58 for time, .08 for group, and .32 for time \times group interaction.

Additionally, it is also possible that the MI intervention employed in the present study may have been offered in too low of a dose to demonstrate differences between groups (i. e., two 35 minutes sessions may not have been long enough to facilitate the self-efficacy changes demonstrated in previous research). Although previous research has demonstrated MI effectiveness in small doses, one meta-analysis reported the average MI intervention time as just over two hours (Rubank, et al., 2005). This average is almost twice as much time as was offered in the present study.

Further, it is important to recognize the possibility that MI may not actually impact health behavior self-efficacy beliefs. Although this is a possibility, previous research suggests that a strong relationship between MI and health behavior self-efficacy does exist (Chou et. al., 2009; Hettema et al., 2005; Miller & Rose, 2009). Thus, instead of giving up on attempts to observe and better understand the impact of HPE+MI on self-efficacy beliefs, it seems likely that the study limitations outlined above contributed to our failure to reject our null hypotheses.

A final possibility regarding the lack of support for our primary hypotheses that HPE+MI groups would demonstrated higher self-efficacy beliefs across time is that, MI interventions are considered most effective when they are used with participants in early stages of change. Participants in the present study self-selected into a health behavior change study, and, surprisingly, many reported falling in late stages of change at baseline. Thus, it is also possible that the HPE+MI intervention would have been more effective in a different subgroup of VR consumers reporting earlier stages of change at baseline.

Health Related Quality of Life

We hypothesized that health related quality of life beliefs post treatment (as measured by the CDC-HRQOL's Unhealthy Days Score, Activity Limitation single item, and Summary Score) would be significantly lower in the HPE+MI group than both other intervention groups. Additionally, post treatment quality of life beliefs (as measured by the BRFSS Quality of Life single item) were expected to be significantly higher in the HPE+MI group than both other intervention groups. These hypotheses were not supported. In fact, no significant main effects for group or group \times time interaction effects were identified for any of the health related quality of life analyses, and it is possible that

limitations in this pilot study described above may have contributed to our failure to reject the null hypothesis.

Despite these nonsignificant findings, there is a need for further research exploring the comparative effectiveness of interventions on reducing unhealthy days while addressing the present study limitations. For example, reducing the number of unhealthy days PWD experience could have a important impact on lost productivity due to absenteeism (lost workdays) or presenteeism (reduced job performance) of PWD over time. This is important because chronic disease, which is positively correlated with unhealthy days, was associated with 1,047 billion dollars in lost economic output (including substantial cost related to lost workdays and reduced job performance of unhealthy individuals and their caregivers) in the United States in 2003 alone (DeVol, et al., 2007; US Department of Health and Human Services, 2000).

Importantly, main effects for time were demonstrated for three of the four quality of life indices. These findings suggest that all three health behavior change interventions positively impacted self-reported health related quality of life over time. More specifically, participants reported fewer unhealthy days, fewer days in which their activity levels were negatively impacted by poor physical or mental health, as well as overall improved health related quality of life as measured by the CDC-HRQOL Summary Score. This finding is important because some have posited that consumer motivation to engage in rehabilitation services is at least somewhat driven by the belief that life will get better as a result of participation in rehabilitation programs (Rubin et. al., 2003). If this is indeed the case, developing health promotion programs, such as the ones implemented in the present study that increase self-reported health related quality of life, may be an important step in

enhancing VR services. This main effect for time on HRQOL beliefs may be even more important finding given that some have argued that quality of life measures should be a primary target outcome variable alongside employment status for rehabilitation programs (Bishop & Fiest-Price, 2001; Roessler, 1990).

Given that our sample average score on reported activity limitation days (mean = 11.6) and number of reported unhealthy days (mean = 20.2) at baseline were much higher than national averages in the general population (i.e., mean unhealthy days = 5.3 and mean activity limitation days = 1.7), it is possible that the identified main effects for HRQOL measures could also represent a case of regression to the mean (CDC, 2000). It is also known, however, that persons whom endorse being “unable to work” tend to report much higher mean scores on these HRQOL measures (i.e., mean unhealthy days = 19.9 and mean activity limitation days = 13.4) (CDC, 2000). Thus, observed means at baseline appear to more closely reflect population means, when the comparison population is unemployed persons. As a result, regression to the mean, although a possibility, appears to be an unlikely explanation for the observed effects.

In contrast to the HRQOL main effects described above, no main or interaction effects were demonstrated during analyses of the general health item (i.e., “Overall how would you rate your quality of life?”). This finding suggests that participants may have perceived overall quality of life to be comprised of a different set of variables than the more health specific quality of life discussed previously. Of note, this more broadly defined assessment of quality of life does not appear to be influenced by the present study’s health behavior change interventions. This finding is consistent with a growing body of literature that describes health related quality of life as a different and more

narrowly defined quality of life measurement made up of both psychological and physical indices of health (Anderson & Burckhardt, 1999; Andresen & Meyers, 2000; Bishop et al, 2008; Hays, Hahn, & Marshall, 2002; Holmes, 2005). Taken in concert, these findings suggest that all three interventions in the present study may positively impact health related quality of life, which includes both mental and physical indices, over time, but is not effective in impacting how participants perceive their overall life quality, which is likely comprised of a broader range of indices.

Stage of change

Contrary to expectations, when compared to the other two treatment groups at four month follow-up, more HPE+MI participants did not report at least one forward stage shift on any of the four target behaviors. Importantly, however, 60% of all participants reported at least one forward stage transition during that time. This finding that participants from all intervention types reported movement toward creating desired health behavior changes, might suggest that forward shifts in stage are possible even when interventions (such as the HPE factsheets group) are minimal. Although this finding is difficult to interpret given the lack of a true control group, there is some previous research that suggests minimal information only health promotion interventions can effectively promote health behavior change several months post intervention (Stadler, Oettingen, & Gollwitzer, 2010).

Interestingly, graphs of the forward shift data plotted by group illustrate some potentially interesting trends. While the HPE online group's forward stage shift was relatively consistent between 2 and 4-month-follow-up, the factsheets group reported less forward change from baseline to 4 month than baseline to 2 month. This suggested that the factsheets participants experienced the bulk of their forward movement early and the

positive effects dissipated over time. In contrast, the HPE+MI participants reported fewer forward stage transitions at 2 month follow up as compared to their forward stage shifts reported at four month follow-up. These findings reflect a possible trend in the data, which suggests that the addition of MI to the HPE online intervention may have resulted in more durable effects on forward stage movement. This finding would be consistent with previous research demonstrating that when MI is issued prior to treatment, treatment effects tend to be larger and longer lasting (Hettema, Steele, & Miller, 2005; Miller & Rose, 2009). For example, several studies exploring the additive effect of adding a brief MI intervention onto an existing alcohol treatment intervention demonstrated about twice the rate of abstinence several months post intervention as compared to treatment participants who had not received MI (Aubrey, 1998; Bien, Miller, & Boroughs, 1993; Brown & Miller, 1993).

A follow up stage of change analysis explored whether proportions of participants reporting forward changes on one or more of the four behavioral domains were significantly different between groups at four month follow-up. Results suggested that many participants reported forward stage transition in more than one behavioral domain, but the proportions of participants reporting 0, 1, 2, 3, or 4 forward stage transitions across target behaviors did not significantly differ across groups. Despite these nonsignificant group effects, the HPE+MI group evidenced the lowest proportion of participants who experienced ‘no forward shifts.’ It is possible that this proportional difference would be replicated in a larger follow-up study.

Taken in concert, these preliminary findings demonstrated no statistically significant differences in forward stage movement between groups, and it is possible that

the present interventions do not impact stage of change for the specified health behavior domains. Although this possibility cannot be ruled out, previous research does demonstrate a link between behavior change interventions similar to those employed here and forward stage transition (Prochaska et al., 2008). Thus, an alternative reason that anticipated group effects in forward stage transition were not demonstrated is that, contrary to expectation, high proportions of participants entered the study in advanced stages of change readiness, including the action or maintenance stage. Given that the VR population is comprised of PWD, whom tend to experience more health-related problems than the general population (CDC, 2000), and that the participants were not seeking treatment, we expected higher proportions of participants to report pre-contemplation or contemplation stages of change at baseline. As discussed previously, MI appears to be more effective for people in early stages of change (Miller & Rollnick, 2002). Thus, it is possible that the HPE+MI intervention might prove more effective as compared with other intervention groups with different subgroups of VR participants in precontemplation or contemplation stages of change at baseline. Ultimately, it appears likely that participants' high degrees of readiness at baseline restricted the range of possible forward stage movement for a significant portion of participants.

It is also possible that the lack of significant stage of change findings in the present study may be related to stage of change measurement issues. A growing body of literature has been questioning the validity of stage measurements assessing more complex behavioral categories such as physical activity and eating a balanced diet (Adams & White, 2003; Brug, Conner, Harre, Kremers, McKellar, & Whitelaw, 2005; Lenio, 2006; Povey, Conner, Sparks, James, & Shepard, 1999). Unlike addiction behaviors, on which the TTM

was originally developed, endpoints indicating action/maintenance stages are more difficult to define with more complex behaviors (e.g., using or abstaining from substances versus generally getting regular physical activity) (Povey et al., 1999). The more targeted addiction behaviors also tend to be associated with associated quit dates as well, which can make estimating behavior change durations easier. This is important given that the distinction between action and maintenance stages are based solely on the duration of a particular health behavior. As a result, researchers are increasingly acknowledging the difficulty of assessing stage of change associated with more complex behavioral categories that encompass a variety of less well defined health behaviors.

Previous research and theory also suggests that a person can be in different stages of change on different behaviors within the same broader behavioral category (e.g., a person could be in action on walking the four blocks to work and be in contemplation on working out a gym), which can further complicate findings on self-report stage measurements related to more complex behavioral categories such as overall physical activity (Brug, et al., 2005; Ni Mhurchu, Margetts, & Speller, 1997). Additionally, previous research by Povey and colleagues (1999) showed that people tend to self report later stages of change on diet behaviors than is actually reflected on more objective reports of diet. This mismatch in perceived versus actual behavior was most evident when assessing broadly defined behaviors (e.g., healthy eating), and it diminished when assessing more specific eating behaviors (e.g., eating five portions of fruits and vegetables per day).

Since stage measures tend to be based on self-report rather than more objective measures, persons overestimating stage may be considered in maintenance stage while

being unaware that his/her health behaviors are not consistent with recommendations. Thus, some researchers in the field have proposed the potential utility of qualifying stages of change as with or without awareness. For example, an aware contemplator would be contemplating a behavior change because he would understand his current behavior did not meet recommendations. Similarly, an unaware precontemplator, might not be considering a change, because she believes she is already in the maintenance stage of eating a balanced diet and is unaware that her current behaviors do not meet recommended guidelines (Lechner, Brug, de Vries, van Assema, & Mudd, 1998).

Anecdotal information from the present study offered by the motivational interviewers suggest that many participants whom reported later stages of change on the four target behavioral categories at baseline, described behaviors associated with much earlier stages of change during the MI portion of the intervention. Thus, it is possible that the present study's lack of significant findings on stage of change measures might reflect a consciousness raising effect in some participants resulting from receiving new health information as well as from reflecting more carefully on his/her psychological and behavioral states during the MI interviews. Thus, it is possible that backward stage of change movements could actually represent overall improvement on some participants' awareness of their current health behaviors. Importantly, Povey and colleagues (1999) showed that overestimates on later stages of dietary change diminished when the dietary target behaviors assessed were less complex and better defined. Because the present study encouraged targeted behavior changes through the individualized goal setting portion of the intervention, it might be helpful in future studies to assess stage of change on these

more targeted behaviors rather than on the more complex behavioral categories in which the behavior falls.

Finally, normal stage transition frequently involves relapses backward to earlier stages of change before again moving in the direction of later stages of behavioral change (Neuwenhuijsen et al., 2006), and these expected forward and backward shifts over time may have made it more difficult to identify clear trends in such a small sample size over a brief 4 month time period. As a result, future research employing a larger sample and longer study duration is needed to fully understand the relative effectiveness of the interventions in facilitating forward stage movement on target health behaviors over time.

Limitation from Secondary Conditions

We predicted that post intervention self-reported limitation from secondary conditions (as measured by the SSCI) would be significantly lower in the HPE+MI group than both other intervention groups. This expectation was not supported, as no significant effects were observed for the group variable or the group \times time interaction. One possible explanation for our failure to reject the null hypothesis is that the HPE+MI is in fact no more effective than other study interventions in facilitating reductions in functional limitation from secondary conditions. It is also possible that, study limitations described above, including low power, may have hampered our ability to identify more nuanced group differences.

Importantly, however, a significant main effect for time was identified, suggesting that all three interventions resulted in a significant decrease in self-reported limitation from secondary conditions. This finding demonstrates that VR consumers may effectively reduce limitation resulting from secondary health conditions by participating in a variety of

self-directed health promotion interventions. This has potentially important implications for VR services, given that high rates of secondary conditions have previously been correlated with low rates of employment in VR consumers (Ipsen et al., 2010, Ipsen, Seekins, & Arnold, 2011). Thus, it appears all three HPE interventions provide an important opportunity for VR consumers to enhance health via decreases in functional limitation. It is also believed that a reduction in limiting secondary conditions may be positively correlated with employment outcomes over time, and future research is needed to test whether improved employment outcomes are positively impacted by participation in HPE programs.

Adherence

A secondary aim of the present study was to test our hypothesis that the addition of MI would facilitate adherence to the HPE online program. This hypothesis was not supported, as no significant difference on treatment adherence was observed between groups. Importantly, both treatment groups evidenced relatively high treatment adherence rates, and almost 73% of participants set a goal online. Additionally nearly half of those participants logged back on to the website at least once to update progress toward their identified health behavior change goal.

One possibility regarding the lack of support for our secondary hypotheses is that MI may not affect treatment adherence. Although this is a possibility, this is inconsistent with a substantial body of research that suggests MI interventions are effective in increasing patient adherence to other interventions, and that these combined interventions are associated with positive health behavior change outcomes (Burke et al., 2004; Hettema et al., 2005; Martins & McNeal, 2009; Miller & Rose, 2009; Rubank et al., 2005; Zweben

& Zuckoff, 2002). Thus, instead of giving up on attempts to observe and better understand the impact of HPE+MI on treatment adherence, it seems likely that study limitations previously outlined contributed to our failure to reject our null hypothesis. These limitations include the reasoning that MI interventions tend to be more effective in early stages of change (Miller & Rollnick, 2002). In contrast, present study participants appeared motivated to engage in treatment regardless of intervention type, which is reflected by high overall program completion rates (82%). Given previous research, it is possible that the HPE+MI intervention might facilitate higher treatment adherence in a VR subgroup that reported less readiness to engage in treatment at baseline.

In keeping with MI principles, the motivational interviewers informed HPE+MI participants during the first MI call that the decision to participate in HPE online was theirs to make. It is unclear whether this emphasis on participant autonomy in the HPE+MI group impacted online adherence. Anecdotally, interviewers interacted with several participants who completed MI calls and set health behavior change goals during those calls, but chose not to participate in the online portion of the intervention for a variety of reasons.

Further, treatment adherence was originally proposed to include additional indicators such as self-reported steps taken toward goals or goal completion, which were to be culled from program evaluations. Unfortunately, however, low program evaluation response rates precluded inclusion of these indicators in the final adherence analyses. Thus, future research should explore the impact of adding MI to the HPE online intervention in larger study which includes multiple adherence indices. It may also be that different types of participants (e.g., education levels, readiness to change, etc.) may prefer different types

of interventions, and it might be most effective to encourage consumers to self-select into their treatment group of choice.

Program evaluations

The present study was designed as a pilot study to answer questions about the potential utility of conducting a larger scale study of the effectiveness of the HPE+MI intervention. Thus, program evaluations were sent out to all participants asking them to rate different aspects of the interventions. Only 88 of the original 142 participants (62%) returned these surveys, which raises the possibility that responses do not reflect the entire continuum of participant experiences. Notwithstanding this possibility, some useful information about the potential utility and feasibility of implementing a larger scale study was collected through the program evaluations. For example, about 84% of all responders across treatment groups indicated that they would recommend the program to others. This important finding further suggests that most responders found the interventions to be helpful, and it seems logical that programs that are perceived by participants as useful will be more likely to be adhered to over time.

Additionally, 67% of responders whom were randomized to the HPE+MI group reported that MI calls were “just the right length” and 88% reported that the telephone based MI calls were helpful. This information suggests an overall positive response to the telephone based MI portion of the intervention, and also provides some indication that VR consumers found the telephone based health intervention to be an acceptable delivery modality for a health promotion intervention. Those who did not participate in the MI calls cited time constraints and scheduling difficulties as barriers to participation. This finding further suggests that, as discussed above, allowing participants to opt into the HPE

program that best fits their lifestyles and learning patterns might further improve treatment outcomes and generate larger intervention effect sizes over time.

Summary and Conclusions

In summary, this study generated a series of important results. To our knowledge it is the first study to explore the effectiveness of implementing a telecommunications-based health promotion intervention targeting multiple behaviors in a population of PWD. As such, these results have the potential to make important contributions to the fields of rehabilitation, health promotion, and motivational interviewing.

Although the present study did not demonstrate the anticipated affect that MI would enhance the effects of an online health promotion intervention, findings do suggest that this combined intervention demonstrated positive outcomes on a variety of intervening proximal outcome variables used to explore behavior change. More specifically, study findings suggest that this combined intervention, like all of the interventions tested, effectively promotes health behaviors for VR consumers, ultimately leading to a decrease in limitation resulting from secondary conditions, forward stage movement on desired health behavior changes, and enhanced health related quality of life. This study also demonstrated that it is possible to deliver MI targeting multiple health behaviors via the telephone to PWD with a high degree of fidelity to MI principles. Moreover, the majority of MI participants found the intervention to be both acceptable and helpful. It is also likely that given participant attrition this small pilot study was underpowered to detect more nuanced group differences. Given the small but statistically significant main effects the interventions demonstrated on behavior specific self-efficacy beliefs, health related quality of life, and limitation resulting from secondary conditions, a larger study aimed at further

exploring the comparative effectiveness of these interventions in a wider range of VR consumers is warranted.

Additionally, study results suggest that PWD enrolled in VR programs can benefit from telecommunication based health behavior change interventions targeting multiple health behaviors, and that the specific delivery modality (e.g., telephone, interactive website, or emailed factsheets) of health information may be less important than was originally thought. This is an important finding, because these new alternative means of providing health promotion help to maximize cost effectiveness while simultaneously overcoming numerous access to care barriers, which PWD disproportionately experience (Dutta, 2009; Parker et al., 2009; Altman & Bernstein, 2008).

Finally, the present study also serves as an important first step in creating and implementing a systematically accessible and affordable health promotion program to unemployed PWD, an underserved population at risk for developing further limiting secondary health conditions. It is hoped that the present study findings will help lay the foundation for demonstrating a clear link between health promotion and enhanced employability that can guide the development of future rehabilitation programs.

Study limitations

In addition to the potential power and measurement issues discussed above, this study design had several limitations that are important to acknowledge. First, the present study did not have a true control group that received no treatment intervention. As a result, the causal interpretations regarding the main effects for time observed throughout the study are offered with caution, and regression to the mean remains a possible explanation for the observed main effects for time. Secondly, the study did not allow for equal amounts of

time spent participating in the intervention between the three intervention groups. Thus, any of the hypothesized differences or identified trends between groups could be attributable to differences in time spent participating in the intervention rather than to differences in the characteristics and components of each specific intervention. Thirdly, this pilot study included only 142 participants. As such, it was not powered to detect actual behavioral changes, and relied instead on intervening proximal variables such as change readiness and self-efficacy beliefs to help us gauge the potential utility of implementing HPE+MI on a larger scale. Fourth, most outcome variables of interest (e.g., quality of life, self-efficacy, activity limitation, and stage of change) were self-report, and we have no objective way of knowing whether the participant reported their experiences accurately. Lastly, long-term findings from this study are limited to a four-month follow-up. As a result, we have no way of knowing whether health behavior changes and differences between intervention groups will last or emerge after the study window.

Additionally, study participants were predominantly middle-aged Caucasian adults with a primary physical disability, who averaged at least some college education. Further, participants self-selected to participate in this health behavior change intervention. Thus, generalization of findings to larger and more diverse consumer groups within the VR system should be done with caution. In conclusion, many of the present findings appear promising, and future research is needed to address these study limitations and to better understand the comparative effectiveness of interventions for health behavior change across a wider variety of VR consumers. Additionally, future research is needed to test whether or not there is in fact a causal link between improved health, as was demonstrated

across all interventions groups in the present study, and employment outcomes within the VR system.

CHAPTER 5:

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Appendix A

Demographic Information

Please fill in the following information about you. This information provides background for the rest of your answers on this survey.

1. Age _____

2. What is your sex?

_____ male

_____ female

3. State and county of residence: _____ / _____
state county (not country)

4. Education (*check your highest level of education*):

_____ Less than 8th grade

_____ Grades 9 – 11

_____ Grades 12 or GED (high school graduate)

_____ Some college or technical school training

_____ Bachelor's degree

_____ Master's or doctorate degree

5. Marital status (*check your current status*):

_____ Married

_____ Divorced

_____ Widowed

_____ Separated

_____ Never married

_____ A member of an unmarried couple

6. Which best describes you? (*check all that apply*)

_____ Caucasian

_____ African American or Black

_____ Hispanic or Latino

_____ American Indian or Alaska Native

_____ Native Hawaiian or other Pacific Islander

_____ Asian

_____ Other

7. Health care coverage (*check all that apply*):

- Medicaid
- Medicare
- Military/Veterans provided health insurance/benefits
- Indian Health Service
- Private health insurance or HMO or COBRA
- No health insurance

8. Social Security Benefits (*check all that apply*):

- Social Security Income (SSI)
- Social Security Disability Insurance (SSDI)
- Temporary Assistance for Needy Families (TANF)
- Veterans' Disability Benefits
- Workers' Compensation

9. What is your current employment status? (*check one*)

- Not currently employed
- Employed full-time
- Employed part-time

10. In the last three months, did you have a health problem that prevented you from meeting any goals or benchmarks of your employment plan?

- No
- Yes (Please explain: _____)

7. During the past 30 days, for about how many days did pain make it hard for you to do your usual activities, such as self-care, work, or recreation? (*circle one*)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

8. During the past 30 days, for how many days have you felt sad, blue, or depressed? (*circle one*)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

9. During the past 30 days, for about how many days have you felt worried, tense, or anxious? (*circle one*)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

10. During the past 30 days, for about how many days have you felt that you did not get enough rest or sleep? (*circle one*)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

11. During the past 30 days, for about how many days have you felt very healthy and full of energy? (*circle one*)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

12. Are you limited in any way in any activities because of an impairment or health problem?

_____ Yes

_____ No

13. Because of an impairment or health problem, do you need the help of other persons with your personal care needs such as eating, bathing, dressing, or getting around the house?

_____ Yes

_____ No

14. Because of an impairment or health problem, do you need the help of other persons in handling your routine needs, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?

_____ Yes

_____ No

15. Do you have any health problem that requires you to use special equipment, such as a cane, wheelchair, a special bed, or a special telephone?

_____ Yes

_____ No

16. What is your disability? (*check all that apply*)

_____ Sensory Impairment (i.e. visual or hearing impairment, communication impairment)

Please describe: _____

_____ Physical Impairment (i.e. mobility impairment, spinal cord injury, fibromyalgia, stroke, AIDS)

Please describe: _____

_____ Cognitive Impairment (i.e. mental retardation, traumatic brain injury, learning disabilities)

Please describe: _____

_____ Mental Health Impairment (i.e. anxiety disorder, depression, eating disorder, bipolar, schizophrenia)

Please describe: _____

_____ Substance abuse or dependence

Health Beliefs

We would like to know how confident you are in doing certain activities. For each of the following questions, please circle the number that corresponds to your confidence that you can do these tasks regularly at the present time.

1. How confident are you that you can keep fatigue from interfering with the things you want to do? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

2. How confident are you that you can keep physical discomfort or pain from interfering with things you want to do? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

3. How confident are you that you can keep emotional distress from interfering with the things that you want to do? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

4. How confident are you that you can keep any other symptoms or health problems you have from interfering with the things you want to do? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

5. How confident are you that you can do the different tasks and activities needed to manage your health condition so as to reduce your need to see a doctor? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

6. How confident are you that you can do things other than just taking medication to reduce how much your illness affects your everyday life? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

7. How confident are you that you can maintain a balanced diet? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

8. How confident are you that you can effectively manage the stress in your life on a regular basis? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

9. How confident are you that you can participate in regular physical activity? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

10. How confident are you in your ability to use good sleep patterns that allow you to get quality sleep on a regular basis? (*circle the number*)

Not at all	_____										Totally
Confident	I	I	I	I	I	I	I	I	I	I	Confident
	1	2	3	4	5	6	7	8	9	10	

Health Practices ---

Stress Management includes regular relaxation and physical activity, talking with others, thinking positively, and/or making time for social activities.

1. Do you effectively practice stress management in your daily life? (*check one*)

- YES, and I have done so for MORE than 6 months.
- YES, but I have done so for LESS than 6 months.
- NO, but I intend to do so within the next 30 days.
- NO, but I intend to do so within the next 6 months.
- NO, and I do NOT intend to do so in the next 6 months.

A Balanced Diet includes eating foods from each of the five food groups every day. The food groups are grains, fruits, vegetables, dairy, and protein (meat, poultry, fish, eggs, nuts and beans). Eating a healthy balanced diet also includes choosing foods low in saturated fats, *trans* fats, cholesterol, salt and added sugars, and drinking enough water.

2. Do you consistently eat a balanced diet? (*check one*)

- YES, and I have done so for MORE than 6 months.
- YES, but I have done so for LESS than 6 months.
- NO, but I intend to do so within the next 30 days.
- NO, but I intend to do so within the next 6 months.
- NO, and I do NOT intend to do so in the next 6 months.

Regular Physical Activity is any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 to 5 times per week for 20 to 60 minutes per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing and heart rate and causes you to break a sweat.

3. Do you exercise regularly according to this definition? (*check one*)

- YES, and I have done so for MORE than 6 months.
- YES, but I have done so for LESS than 6 months.
- NO, but I intend to do so within the next 30 days.
- NO, but I intend to do so within the next 6 months.
- NO, and I do NOT intend to do so in the next 6 months.

Sleep Hygiene consists of things you do on a regular basis to help you get enough sleep each night so that you wake up feeling rested in the morning. Some habits that might be part of good sleep hygiene include things like going to bed at the same time each night, not drinking caffeine in the evening, not exercising or eating big meals right before bedtime, and using relaxation or breathing techniques to reduce stressful worries before going to bed.

4. Do you consistently practice good sleep hygiene that allows you to get adequate sleep?
(*check one*)

- YES, and I have done so for MORE than 6 months.
- YES, but I have done so for LESS than 6 months.
- NO, but I intend to do so within the next 30 days.
- NO, but I intend to do so within the next 6 months.
- NO, and I do NOT intend to do so in the next 6 months.

Secondary Conditions

A secondary condition is a problem experienced after you already have a disability. For example, a person with back pain may develop arthritis. Arthritis would then be a secondary condition for that person. Like a health condition, a secondary condition may limit your ability to do things independently.

Please rate how much each of the following conditions have affected your activity and independence in the last three months. If you have not experienced a secondary condition in the last three months, or if it is a small problem for you, please circle "0". Please refer to the rating scale for making your ratings.

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating	Secondary Condition	Description
0 1 2 3	Pressure Sores	Pressure sores develop as a skin rash or redness and may progress to an infected sore. They may also be called skin ulcers, bedsores, or decubitus ulcers. Persons who use wheelchairs are at risk for developing pressure sores.
0 1 2 3	Spasticity (Muscle Spasms)	Spasticity refers to uncontrolled, jerky muscle movements, such as uncontrolled muscle twitch or spasm. Often spasticity increases with infection. Persons with multiple sclerosis, cerebral palsy, and spinal cord injury are among individuals at risk for developing spasticity.
0 1 2 3	Scoliosis Lordosis	These three terms refer to an abnormal curvature of the spine. Scoliosis is the curvature of the spine sideways. Lordosis and Kyphosis refer to the forward curvature of the spine (hunchback). Persons with SCI are at risk

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating	Secondary Condition	Description
	Kyphosis	of these because of not sitting right, muscle imbalance, or paralysis.
0 1 2 3	Contractures	A contracture is a limitation in range of motion caused by shortening of the soft tissue around a joint (e.g., elbow, hips). This occurs when a joint cannot move frequently enough through its range of motion. Pain commonly accompanies this condition.
0 1 2 3	Osteoporosis	This is a wasting of bone. It may cause pain, can lead to fractures, and predisposes individuals to developing urinary tract stones. Any disabled individual who is not able to have adequate weight bearing exercise on their bones may develop osteoporosis and women are at particular risk. It is diagnosed by a physician.
0 1 2 3	Arthritis	Arthritis results from inflammation of the joints, making movement both difficult and painful. Symptoms include pain and swelling around the joints. Cold weather and stress can make this condition worse.
0 1 2 3	Fatigue	Fatigue is a tired (though not necessarily sleepy) feeling after minimal exertion.
0 1 2 3	Physical Fitness/Conditioning Problems	Some disabled persons find they are not able to do as much as they would like because they are out of shape.
0 1 2 3	Eating or Weight Problems	This includes difficulty in regulating weight, as well as problems with eating (e.g., overeating, under eating, vomiting food).

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating	Secondary Condition	Description
0 1 2 3	Bladder Dysfunction	Incontinence, bladder or kidney stones, kidney problems, leakage, urine backup, and associated problems are all symptoms of bladder dysfunction. Persons with impaired or absent muscle function in the bladder area are also at risk.
0 1 2 3	Bowel Dysfunction	Diarrhea, constipation, "accidents," and associated problems are signs of bowel dysfunction. As with bladder dysfunction, persons with impaired muscle function or paralysis in the abdominal region are most likely to have bowel dysfunction.
0 1 2 3	Urinary Tract Infections	Urinary tract infection includes such infections as cystitis and pseudomonas. Symptoms include pain on urination, a burning sensation throughout the body, blood in the urine, and cloudy urine. Persons with multiple sclerosis and spinal cord injury are at increased risk for urinary tract infections.
0 1 2 3	Sexual Dysfunction	This includes dissatisfaction with sexual functioning. Causes for dissatisfaction can be decreased sensation, changes in body image, difficulty in movement, concern over bladder and bowel routines.

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating	Secondary Condition	Description
0 1 2 3	Dysreflexia	Dysreflexia (sometimes called hyperreflexia) results from interference in the body's temperature and blood pressure regulating systems. Symptoms of dysreflexia include sudden rises in blood pressure and sweating, skin blotches, goose bumps, pupil dilation and headache. It is often related to overflowing leg bags. Dysreflexia can also occur as the body's response to pain where an individual doesn't experience sensation.
0 1 2 3	Carpal Tunnel Syndrome	This is a nerve disorder in the hand that causes pain and loss of feeling, especially in the thumb and first 3 fingers. Symptoms include numbness or tingling in part of the hand, shooting pains up the arm, thumb weakness, frequent dropping of objects, and shiny, dry skin on the hand.
0 1 2 3	Postural Hypotension	This involves a strong sensation of lightheadedness following a change in position. It is caused by a sudden drop in blood pressure. Individuals with spinal cord injury or stroke may experience postural hypotension.
0 1 2 3	Cardiovascular (Heart) Problems	This commonly involves high or low blood pressure and must be diagnosed by a physician because there are often no symptoms. Other heart problems may be signaled by fluid retention - usually resulting in swelling around the ankles.
0 1 2 3	Circulatory Problems	Swelling of veins, feet, or the occurrence of blood clots.

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating				Secondary Condition	Description
0	1	2	3	Respiratory Problems	Pneumonia and other respiratory tract infections can occur in disabled individuals. Symptoms of respiratory infections or problems include increased difficulty in breathing and increased secretions. Persons with quadriplegia, post polio, rheumatoid arthritis and multiple sclerosis are especially at risk for respiratory complications and infections.
0	1	2	3	Chronic Pain	This is usually experienced as chronic tingling, burning or dull aches. It may occur in an area that normally has little or no feeling.
0	1	2	3	Joint and Muscle Pain	This includes pain in specific muscle groups or joints. Individuals who must overuse a particular muscle group (e.g., persons with paraplegia who may strain shoulder muscles) or those who must put too much strain on joints are at risk of developing joint and muscle pain.
0	1	2	3	Depression	Depression is more than feeling blue. Symptoms include: extreme, long-term sadness, loss of pleasure in favorite things and activities, difficulty sleeping, weight loss or gain, thoughts of suicide and frequent and/or unexplained crying.
0	1	2	3	Anger	Anger problems include extreme displeasure with situations or persons that are difficult to forget.
0	1	2	3	Isolation	Isolation from social contact and support may be a problem for some individuals, and may be due to a loss of relationships or being house-

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating	Secondary Condition	Description
		bound.
0 1 2 3	Problems with Mobility	Many people with physical disabilities have difficulty getting around due to a loss of strength or muscle control.
0 1 2 3	Substance Abuse	Substance abuse is the excessive use of a substance, especially alcohol or a drug.
0 1 2 3	Diabetes	Diabetes is a problem resulting from irregularities in blood sugar levels. Symptoms include frequent urination and excessive thirst. This condition is diagnosed by a physician. Individuals who are overweight are at higher risk for developing Type 2 diabetes.
0 1 2 3	Anemia	Anemia is a low level of iron in the blood and often occurs in conjunction with pressure sores. Symptoms include fatigue and low energy. This condition is diagnosed by a physician.
0 1 2 3	Sleep Problems/ Disturbances	Sleep problems may include difficulty falling asleep or staying asleep, difficulty staying awake during the day, or waking up early.
0 1 2 3	Access Problems	Access problems in the environment, such as lack of curb cuts, accessible buildings or accessible restrooms, can pose an obstacle to functioning independently.
0 1 2 3	Equipment Failures	Equipment failures, such as a broken walker or brace, can limit independence by increasing the difficulty or prohibiting the completion of many desired activities.

Rating Scale

0 = Not experienced during the past three months/insignificant problem (rarely or never limited activity or independence)

1 = Mild or infrequent problem (limits activity 1-5 hours per week)

2 = Moderate/occasional problem (limits activity 6-10 hours per week)

3 = Significant/chronic problem (limits activity 11 or more hours per week)

Rating	Secondary Condition	Description
0 1 2 3	Injuries Due to Loss of Sensation	Many people with disabilities that involve loss of sensation (for example, a spinal cord injury or MS) report injuries because they cannot feel pain in some areas (for example, frostbite or burns from sitting too close to a fire).

Appendix B

HPE plus Telephone MI Intervention Protocols

The following MI protocols have been modified from van Keulen and colleagues' (2008) telephone delivered MI protocol which was originally based on MI protocols developed by Resnicow and colleagues (2002) during the Healthy Body Healthy Spirit study. As intended by the authors, the protocol was used flexibly as a tool to guide each interview rather than as a script, and each interview varied depending on the participant's level of motivation, self-efficacy beliefs, and current stage of behavior change. Gray highlighting in the protocol denotes important aspects of the protocol that the interviewer needed to make sure they addressed during each interview.

Session 1

The initial MI session explored how the participants' health behaviors may differ from their health values and beliefs. It also focused on exploring how participants perceived that their current health behaviors impacted their lives and limiting secondary conditions. Topics of discussion varied widely depending on what health behaviors the participant chose to focus on. The motivational interviewer had access to information on the participant's disability, level of perceived limitation, and stage of readiness to change on the four study target behaviors (exercise, diet, sleep, and stress) prior to the initial session. This information was used to help guide the MI intervention.

MI Protocol (Session 1)

1. Introduce self and build rapport.

- *"My name is _____, and I am calling as part of the health behavior change research study that you signed up to participate in."*
- *Is this still a good time for you to participate in this study?"*

2. Limits confidentiality

- *"Before we begin, I want to remind you that any information you share with me today will be kept strictly confidential."*
- *"This call is being audio recorded in order to monitor what I say during this interview. However, no written or oral reports of what you tell me today will have any information that identifies you."*
- *"I do need to let you know, however, about some limits to confidentiality."*
- *If at any time during the interview today you tell me about known or suspected child abuse, abuse of an elderly person or abuse of a person with a disability, I may have to break confidentiality in order to help keep people safe. Similarly, if you tell me*

that you have intent to harm yourself or someone else, I might also have to break confidentiality in order to help keep you as well as others safe.”

- *“Before we begin the interview, do you have any questions that I can answer about this study?”*

3. Frame the study.

- So there are 3 different pieces to this study that I want to let you know about.
- The first is this interview that I anticipate lasting about 30 minutes. During this time, we will focus on exploring how your current lifestyle patterns related to diet, exercise, sleep and/or stress management might be impacting your health as well as on your motivation to make healthy lifestyle changes in these areas.
- The next piece of the study is a computer based program, which offers additional information about health management as well as guides you through a goal setting process.
- Finally, we will do one more interview over the phone in about 2 to 3 weeks.
- We hope you will find this to be helpful process; however, ultimately how you use this program is entirely up to you.
- Do you have any questions at this time? Would it be okay with you then if we begin the interview?

4. Summarize participant’s perceived limitations (survey data)

- I am taking a look at your survey answers and if I could just summarize what you reported on the survey... You indicated that you are significantly limited by.... In your daily life. Does this sound accurate? (Summarize only severe limitation if more than 4 indicated; otherwise, summarize severe & moderate limitations).

5. Explore how current diet, exercise, sleep and stress habits might be impacting the development/maintenance of limitation.

- I am wondering in what ways you think things like diet, exercise, stress management and sleep might be affecting your limiting conditions?

- What have you noticed? (briefly review all 4)
- Because we have limited time today, and because it is ultimately up to you to decide how you want to manage your health, I want to make sure we use this time in a way that feels helpful to you.
- So, in terms of sleep, diet, exercise or stress management, which one of those behaviors would you like to focus on today? (target behavior)
- What kinds of changes have you thought about making?
- What would be the potential benefits of changing your?
- How might your life be different if you made ____ change?
- Other potential benefits?

6. Readiness? (target behavior)

- Readiness Ruler (importance/confidence/readiness)
 - Why not a Lower number/zero?
 - What would it take to move you to a higher number?

7. EXPLORE

- Specifics about how/what might need/do to change...
- Review & EXPAND present options
- Support Autonomy
 - What do you think you might do?

8. Summarize & Ask for feedback.

- So let me see if I got this right...
 - You are feeling limited by a number of health conditions including:
 - Thinking about possibly making a change in _____ to help you manage your health more effectively.
 - Cons (barriers)/Pros (motivation)
 - You are (READY, FEELING STUCK, WONDERING WHAT NEXT?)
- Did I miss anything that feels important to you?
 - If so, re-summarize
- So you are really thinking about making a change here, and you still have some questions about how you might effectively manage your _____. You are

wondering what kinds of things you might do to _____. And ultimately these decisions are entirely up to you.

9. Describe next step

- So unfortunately we are running out of time for today, and I am wondering if the next piece of the program that is available to you might be really helpful for you. Can I take a minute to tell you a little more about it?
- It is an internet-based computer program that is designed to offer more tailored information about how your health limitations might be linked to your current health behaviors. It also offers additional information about possible ways to manage your health as well as helps you think through what you might want to do next.
- I think it is important to mention again, however, that it is entirely up to you how you want to manage your health. This program is simply designed to help you explore your options and offer some additional information that may be useful to you.
- So we will email you link to the Internet based educational and goal setting process today.
- Call 243-2208 if you have trouble logging on to the website. Questions about what is going to happen next?

10. Next phone call can be expected in about 3 weeks & close the session.

- Some people prefer to schedule the second interview now to avoid playing phone tag in the future. Other people prefer that we call them in a couple weeks to schedule the second interview when they have a better idea of what their schedule is going to be. Do you have a preference? (schedule if possible for about 3 weeks out).
- Thanks so much for participating & I look forward to talking with you again soon.

ADDITIONAL EXPLORATION NOTES (session 1):

After offering advice:

These are my ideas and I am not sure if they would work for you. It will likely be best if you choose one that will fit your needs, and maybe these I mentioned may give you some other ideas that would work better for you....

NOT READY to change:

- Explore lack of interest or ambivalence with the participant.
 - You're feeling really hesitant to make a change.
 - Pros/cons?
 - What kinds of things get in the way?

- Values Exploration
 - What do you value most about feeling healthy?
 - What other activities that you value might exercise help you do?

(Gardening, playing with children, living independently, increasing work stamina, flexibility to clean house more effectively, etc.)

- Encourage participant to think about change.
 - What do you imagine your life will be like in 5 years if you don't make a change?
 - How might your life be different if you did make change?

READY to change:

- (a) brainstorm possible actions
 - What kinds of health changes have you thought about making?

- (b) Assess perceived ability to change using:
 - Confidence/Importance Rulers
 - What kinds of things have worked in the past?
 - Highlight # things tried. What has worked?

- Facilitate commitment to change (affirmation) and goal setting.
 - You're really ready to make this change.
 - What kinds of things have you thought about?
 - When setting a goal to create a desired behavior change it tends to work better when we take steps toward a goal rather than trying to make the desired

change all at once. What small steps might you take to reach your walking goal?

- Explore barriers or concerns & brainstorm solutions.
 - What kinds of things might get in the way of you attaining your goal?
 - Would it be okay with you if I offered some possible strategies?

Appendix C

Session 2:

During the second MI session, the motivational interviewer also had access to the health behavior change goal that the participant set online (if the participant created an action plan). If the participant had created an action plan, the client's descriptions of values, motivations for change and perceived barriers outlined during the goal setting process were used to help the interviewer guide the session. MI principles were employed to explore and reinforce each participant's motivation to take identified steps toward achieving his/her health behavior change goal.

Three slightly different MI session two protocols were developed. The first was used when an action plan had been created during the internet portion of the HPE program. The second protocol was used when an action plan had not been previously created but the participant had participated in the initial MI session. If the participant had not participated in the initial MI session and had not created an action plan, a slightly modified version of the protocol for the initial MI session was used at time two.

MI Protocol (Session 2 - *goal previously set*)

1. Introduce self & review call purpose.

- *How are you doing today? Is now still a good time for you to participate in this second interview?*
- *I anticipate this interview will last about a half an hour, and during the call we will focus on the health behavior change goal that you recently set as well as on your motivation to work toward your goal.*
- *Questions?*

2. Review audio recording & limits of confidentiality

- *"I want to remind you that any information you share with me today will be kept strictly confidential. However, this call is being audio recorded in order to monitor what I say during this interview.*
- *"I also want to remind you that if at any time during the interview today you tell me about known or suspected child abuse, abuse of an elderly person or of a person with a disability, I might have to break confidentiality in order to help keep people safe. Similarly, if you tell me that you have intent to harm yourself or someone else I might also have to break confidentiality in order to help keep you as well as others safe."*
- *"If you don't have any additional questions at this time, would it be okay with you if we go ahead and begin the interview?"*

3. **Summarizing the participant's recently set health behavior change goal & explore with the participant what led them to set that particular goal.**

➤ *“So I see that you set a _____ goal during the internet based portion of this study that involves _____.”*

➤ *“Because how you manage your health is ultimately up to you, I want to check in and see if this is still a goal that you want to work towards.”*

- *“If no, is there a different health behavior that you would like to focus on today?”*

➤ *“What led you to set this particular goal?”*

4. **Assess IMPORTANCE, READINESS & CONFIDENCE**

“On a scale from 1 to 10 where 1 is not important at all and 10 is extremely important...”

➤ *“Lower number/zero?”*

➤ *“What would it take to move you to a higher number?”*

5. **EXPLORE barriers; brainstorm solutions; Support Autonomy!**

➤ *“What kinds of things might get in the way of you attaining your goal in the long run?”*

➤ *“Would it be okay with you if I offered some possible strategies?”*

6. **SUMMARIZE interview and ask for feedback.**

➤ *“Let me see if I have got this right...”*

➤ *“Did I miss anything that feels important to you?”*

7. **Explain the NEXT STEP in the intervention process (goal reminder emails and the completion of additional survey packets).**

➤ *“We are out of time for today, and I am wondering if would be okay with you if I take a moment to describe what you can expect to happen next?”*

➤ *“So you have now completed the telephone portion of the study, and I want to let you know that for the next several weeks you will receive weekly emails related to the goal you have set for yourself. These emails will allow you to go back and change your goal depending on what you discover about your body and what works and doesn't work for you. Because, in the end, you are ultimately the one in charge of deciding how you want to manage your health.”*

➤ *You will also receive 3 more survey packets in the mail over the next 6 months. Please fill them out and return them in the self-addressed stamped envelope provided. After we receive each of your returned packets, we will send you \$15 by mail.*

➤ *“Do you have any final questions?”*

8. Thank participant & Close session.

➤ *“I want to thank you again for your time today and for participating in these phone calls. I have really enjoyed talking with you, and I wish you the best of luck in completing the goal you have set for yourself.”*

MI Protocol (Session 2- no goal previously set)

9. Introduce self & review call purpose.

- *How are you doing today?" Is now still a good time for you to participate in this second interview?*
- *I anticipate this interview will again last about a half an hour, and during that time we might continue focusing on exploring possible changes you have thought about making in your _____ habits or you might choose to discuss a different health behavior changed that you have been thinking about making. We will also focus on your motivation to work toward these changes. Do you have any questions before we begin?*

10. Review audio recording & limits of confidentiality

- *"I want to remind you that any information you share with me today will be kept strictly confidential. However, this call is being audio recorded in order to monitor what I say during this interview.*
- *"I also want to remind you that if at any time during the interview today you tell me about known or suspected child abuse, abuse of an elderly person or of a person with a disability, I might have to break confidentiality in order to help keep people safe. Similarly, if you tell me that you have intent to harm yourself or someone else I might also have to break confidentiality in order to help keep you as well as others safe."*
- *If you don't have any more questions at this time, would it be okay with you if we begin the interview?*

11. **Summarizing the participant's recently set health behavior change goal & explore with the participant what led them to set that particular goal.**

So I know last time we talked you had mentioned that you were really struggling with _____, and you had been thinking about making a _____ change....

However, because how you manage your health is ultimately up to you, I want to check in and see if this is still a an area of your life that it might be helpful for us to focus on today? Or is there a different health behavior change that you have been thinking about making that you would like to discuss today?

12. Assess IMPORTANCE, READINESS & CONFIDENCE

“On a scale from 1 to 10 where 1 is not _____ at all and 10 is extremely _____ ...

➤ *Lower number/zero?*

➤ *What would it take to move you to a higher number?*

13. Explore & Support Autonomy

- *What kinds of changes have you thought about making?*
- *What has worked for you in the past?*
- *What might you do next?*

14. Summarize interview and ask for feedback.

➤ *Let me see if I have got this right...*

➤ *Did I miss anything that feels important to you?*

15. Explain the next step in the intervention process (goal reminder emails and the completion of additional survey packets).

➤ *“We are out of time for today, and I am wondering if would be okay with you if I take a moment to describe what you can expect to happen next?”*

➤ *So you have now completed the telephone portion of the study, and I want to let you know that it is not too late to logon to the HPE website through the email link I sent you several weeks ago. If you do complete the web portion of this program, you will receive weekly emails related to your goal for the next several weeks. These emails will allow you to go back and change your goal depending on what you discover about your body and what works and doesn't work for you. Because, in the end, you are ultimately the one in charge of deciding how you want to manage your health.*

➤ *You will also receive 3 more survey packets in the mail over the next 6 months. Please fill them out and return them in the self-addressed stamped envelope provided. After we receive each of your returned packets, we will send you \$ 15 by mail.”*

➤ *“Do you have any final questions?”*

16. Thank participant & Close session.

“I want to thank you again for your time today and for participating in these phone calls. I have really enjoyed talking with you, and I wish you the best of luck in completing the goal you have set for yourself.”

ADDITIONAL EXPLORATION NOTES (Session 2):❖ **Assess READINESS**

NOT READY: explore lack of interest or ambivalence.

ALREADY CONSIDERING CHANGE:(a) Brainstorm possible actions

- *“What kinds of things have helped you stick to your goals in the past?”*

(b) Explore barriers or concerns and brainstorm solutions.

- *“What do you think might get in the way of walking on a daily basis?”*
- *“It sounds like in the past _____ has helped _____. “How might you go about motivating yourself to do your _____...”*
- *“How might your current lifestyle have to change in order for you to reach your goal?”*

(c) Facilitate commitment to change (affirmation) & Goal Setting.

- *You’re really ready to make this change.*
- *When setting a goal to create a desired behavior change it tends to work better when we take steps toward a goal rather than trying to make the desired change all at once. What small steps might you take to reach your walking goal?*
- *“What steps are you planning to take to reach your goal?”*
- *Are there other things besides _____ that get in the way of _____?*
- *“You seem very dedicated to reaching your goal, and, at the same time, it sounds like you have some doubts about your ability to do so.”*

❖ **Assess and Enhance Motivation & Self-Efficacy & Health Values.**

- *“What kinds of things have helped you stick to your goals in the past?”*
- *“What is the most beneficial aspect of _____ for you?”*
- *(e.g.) “What other activities that you value might _____ help you do?”*

MI Protocol (Session 1 modified for time 2)

8. Introduce self and build rapport.

- *“My name is _____, and I am calling as part of the health behavior change research study that you signed up to participate in. Is this still a good time for you to participate in this study?”*

9. Limits confidentiality

- *“Before we begin, I want to remind you that any information you share with me today will be kept strictly confidential. “*
- *“This call is being audio recorded in order to monitor what I say during this interview. However, no written or oral reports of what you tell me today will have any information that identifies you.”*
- *“I do need to let you know, however, about some limits to confidentiality.”*
- *If at any time during the interview today you tell me about known or suspected child abuse, abuse of an elderly person or abuse of a person with a disability, I may have to break confidentiality in order to help keep people safe. Similarly, if you tell me that you have intent to harm yourself or someone else, I might also have to break confidentiality in order to help keep you as well as others safe.”*
- *“Before we begin the interview, do you have any questions that I can answer about this study?”*

10. Frame the study.

- *Since we were unable to contact you during the first part of the study, there are only 2 different pieces to this study that you still have an opportunity to participate in....*
- *The first is this interview that I anticipate lasting about 30 minutes. During this time, we will focus on exploring how your current lifestyle patterns related to diet, exercise, sleep and/or stress management might be impacting your health as well as on your motivation to make healthy lifestyle changes.*
- *The second piece of the study is a computer based program, which offers additional information about health management as well as guides you through a goal setting*

- process. You may have noticed that we emailed you the link to this program several weeks ago.
- We hope you will find this to be helpful process; however, ultimately how you use this program is entirely up to you.
 - If you don't have any additional questions at this time, would it be okay with you then if we begin the interview?

11. Summarize participant's perceived limitations (survey data)

- I am taking a look at your survey answers and if I could just summarize what you reported on the survey... You indicated that you are significantly limited by.... In your daily life. Does this sound accurate? (Summarize only severe limitations if 4 or more are indicated; otherwise, summarize severe & moderate limitations reported).

12. Explore how current diet, exercise, sleep and stress habits might be impacting the development/maintenance of limitation.

- I am wondering in what ways you think things like diet, exercise, stress management and sleep might be affecting these limiting health conditions?
- What have you noticed? (briefly review all 4)
- Because we have limited time today and because it is ultimately up to you to decide how you want to manage your health, I want to make sure we use this time in a way that feels helpful to you.
- So, in terms of sleep, diet, exercise or stress management, which one of those behaviors would you like to focus on today? (target behavior)
- What kind of changes have you thought about making?
- What would be the potential benefits of changing your?
- How might your life be different if you made ____ change?
- Other potential benefits?

13. Readiness Rulers (Importance, Confidence, Readiness)

- Why not a Lower number/zero?

- What would it take to move you to a higher number?

14. Summarize & Ask for feedback.

- So let me see if I got this right...
 - You are feeling limited by a number of health conditions including:
 - Thinking about possibly making a change in _____ to help you manage your health more effectively.
 - Cons (barriers)/Pros (motivation)
 - You are (READY, FEELING STUCK, WONDERING WHAT NEXT?)
- Did I miss anything that feels important to you?
 - If so, re-summarize
- So you are really thinking about making a change here, and you still have some questions about how you might effectively manage your _____. You are wondering what kinds of things you might do to _____. And ultimately these decisions are entirely up to you.

15. Describe next step

- So unfortunately we are running out of time for today, and I am wondering if the next piece of the program that is available to you might be really helpful for you. Can I take a minute to tell you a little more about it?
- It is an internet-based computer program that is designed to offer more tailored information about how your health limitations might be linked to your current health behaviors. It also offers additional information about possible ways to manage your health as well as helps you think through what you might want to do next.
- I think it is important to mention again, however, that it is entirely up to you how you want to manage your health. This program is simply designed to help you explore your options and offer some additional information that may be useful to you.
- So we have already emailed you link to the Internet based educational and goal setting process. Please let us know if you did not receive it or need us to resend it to your email account.
- Call 243-2208 if you have trouble logging on to the website. Questions about what is going to happen next?

16. Close the session.

- Thank for participating & I wish you the best of luck on meeting your health goals....

EXPLORATION NOTES (Session 1 at time 2):

After offering advice:

These are my ideas and I am not sure if they would work for you. It will likely be best if you choose one that will fit your needs, and maybe these I mentioned may give you some other ideas that would work better for you....

NOT READY to change:

- Explore lack of interest or ambivalence with the participant.
 - You're feeling really hesitant to make a change.
 - Pros/cons?
 - What kinds of things get in the way?

- Values Exploration
 - What do you value most about feeling healthy?
 - What other activities that you value might exercise help you do?
(gardening, playing with children, living independently, increasing work stamina, flexibility to clean house more effectively, etc.)

- Encourage participant to think about change.
 - What do you imagine your life will be like in 5 years if you don't make a change?
 - How might your life be different if you did make change?

READY to change:

- (c) brainstorm possible actions
 - What kinds of health changes have you thought about making?

- (d) Assess perceived ability to change using:
 - Confidence/Importance Rulers
 - What kinds of things have worked in the past?
 - Highlight # things tried. What has worked?

- Facilitate commitment to change (affirmation) and goal setting.
 - You're really ready to make this change.
 - What kinds of things have you thought about?

- When setting a goal to create a desired behavior change it tends to work better when we take steps toward a goal rather than trying to make the desired change all at once. What small steps might you take to reach your walking goal?
- Explore barriers or concerns & brainstorm solutions.
 - What kinds of things might get in the way of you attaining your goal?
 - Would it be okay with you if I offered some possible strategies?

Appendix D

Mandatory Reporting Procedures:

- 1. The consent form will address the issue of mandated reporting. The motivational interviewer will also remind each participant at the beginning of each phone contact that they are a mandated reporter, and that she might be required to make a report should the participant spontaneously offer information about any of the following during the telephone conversation.**
 - Participant indicates plan or intent to harm self or identifiable other.
 - If information about known or suspected child, elderly or disabled person abuse is offered.

- 2. If a respondent tells the motivational interviewer that he or she has suicidal ideation...**
 - The motivational interviewer will provide a suicide hotline number (national 1-800 number)
 - The motivational interviewer will also offer the respondent a contact name and number for a professional mental health resource in his/her local area such as a mental health center (this # will be different for each study site location).
 - The motivational interviewer will express concern about these thoughts and will encourage the respondent to contact this referral and seek help from a mental health professional.

- 3. If a respondent tells the motivational interviewer he or she intends to harm themselves**
 - The motivational interviewer will provide a suicide helpline number (national 1-800 number) & a local number where the respondent can access professional mental health treatment (this # will be different for each study site location).
 - The motivational interviewer will express concerns about the respondent's safety, and the motivational interviewer will remind the respondent that she is a mandated reporter. The motivational interviewer will then terminate the call and contact local resources who can follow up with the client and request a safety check by the local police if needed.

- 4. If a respondent indicates that he/she has a plan or the intent to harm an identified other...**
 - The motivational interviewer will express concern and remind the participant that she is a mandated reporter. After the call has been terminated the motivational interviewer will contact the local police station (# will be different for each study site location). The interviewer will describe her role with the health behavior change research project, and will share that the participant expressed intent to harm someone. The motivational interviewer will give the police contact information for the participant (name, address & phone number). She will also provide information regarding the individual who was threatened.

- 5. If a respondent tells the motivational interviewer about known or suspected child, elderly or disabled person abuse ...**
 - The motivational interviewer will describe to the participant her concern about the safety of the individual mentioned and the motivational interviewer's obligation by law to report the incident described. The motivational interviewer will then provide a referral number for local mental health professional agency (this # will be different for each study site location), such a local mental health center and encourage them to seek additional support there. After the call is completed, the motivational interviewer will contact the local agency (e.g., Department of Family Services) to which abuse reporting would be made (this # will be different for each study site location) and make a report.

- 6. After any of the above adverse events occurs, the motivational interviewer will follow the attached Rural Institutes adverse events protocol.**