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BUILDING THE CASE FOR DELIVERY OF HEALTH PROMOTION SERVICES
WITHIN THE VOCATIONAL REHABILITATION SYSTEM

By

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Building the Case for Delivery of Health Promotion Services within the Vocational Rehabilitation Program

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The majority of wellness programs are offered at the worksite to full-time employees. Research about these programs indicates that participating employees experience improved health and work-related outcomes, and that outcomes are exaggerated for workers with multiple health risk factors.

People who are not employed or are underemployed cannot access health promotion services at the worksite. This is a significant barrier for people with physical disability because they experience lower rates of employment and higher rates of secondary health conditions than the general population.

Compromised health reduces the probability of full-time employment. Secondary health issues such as pain, depression, anxiety, fatigue, and sleep problems are each associated with worse employment outcomes. Many secondary health conditions, however, can be managed through health promotion activities. Increasing participation in wellness programs may be a viable strategy for improving health and employment outcomes of adults with physical disability. Vocational Rehabilitation provides one possible access point for this delivery.

The purpose of this study was to explore the viability of offering health promotion services within VRs array of services. Consumers of VR (n = 246) were recruited into this study to explore relationships among secondary health conditions, health promoting lifestyle behaviors, and employment. 162 consumers provided data at baseline and an 18 month follow-up measure, and constitute the study sample.

A binary logistic regression model was developed to assess how baseline secondary health conditions and health promoting lifestyle behaviors impacted employment outcome at 18 months. The model included variables to control for demographic characteristics (age, gender, education, marital status), disability severity, and economic indicators (receipt of public insurance benefits). Overall, the sum of secondary conditions score was the only significant predictor of employment. Because secondary conditions can be reduced and managed with health promotion programming, this research supports continued exploration about potential health promotion delivery within the VR system.

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Introduction and Review of the Literature

Worksite health promotion has been evaluated over the last four decades. Results convincingly demonstrate positive financial and health impacts, including reduced health risk factors, reduced insurance claims, lower rates of absenteeism, and positive return on health promotion investment (Chapman, 2005; Pelletier, 2001; Pelletier, 2005). These reported health and cost outcomes are even more pronounced for employees with multiple health risk factors (Pelletier, 2005). Results from multiple large-scale research studies contribute to the growing availability of worksite health promotion programs and activities (U.S. Dept. of Health and Human Services, 2000). Currently, 95% of employers with more than 50 employees sponsor at least one health promotion activity (U.S. Dept. of Health and Human Services, 2000).

Despite significant increases in the availability of health promotion programs at the worksite, opportunities are limited for those who do not work. This is a particularly stark reality for individuals with disability who experience extremely low rates of employment. In 2005, individuals with disability had an employment rate that was 40.2 percentage points lower than individuals without disability (Rehabilitation Research and Training Center on Disabilities Demographics and Statistics - StatsRRTC, 2005).

People with disability, researchers, and policy makers highlight a variety of barriers to explain this persistent difference. Many barriers relate to external factors such as negative attitudes about people with disability at the workplace (Crudden, Sansing, & Butler, 2005), limited workplace accommodations (Allaire, Li, & LaValley, 2003), lack of transportation options (Crudden, et al., 2005; Wehman, et al., 1999), or disincentives built into social insurance benefit programs (Berry, 2000; Brooks, Martin, Ortiz, &

Veniegas, 2004). Other barriers center on individual factors such as low self-esteem (Barlow, Wright, & Kroll, 2001), low self-efficacy (Barlow, Wright, & Wright, 2003), and a variety of secondary health conditions, including depression (Barlow, Wright, & Kroll, 2001; Goldberg & Steury, 2001; Simon, et al., 2000), pain (Haugli, Steen, Laerum, Nygard, & Finset, 2003; Watson, Booker, Moores, & Main, 2004), and sleep problems (Linton & Bryngelsson, 2000). While it is difficult to effectively address external or environmental barriers within the rehabilitation context, many individual barriers to employment may be reduced or eliminated with effective vocational programming. One such barrier is access to health promotion programs which may improve the health and wellness of individuals seeking employment.

The purpose of this research is to evaluate the relationship between health factors and employment in a sample of Vocational Rehabilitation (VR) clients with physical disability. This study includes four surveys collected longitudinally over 18 months to assess how health antecedents such as depression, pain and sleep problems, predict employment outcomes and progression through VR services. If health behaviors and health conditions are shown to affect employment outcomes, health promotion programs may become a strategy to increase employment for people with disability.

I justify this research project by bringing together literature from a variety of fields, including employment, health, and disability. The literature is organized to demonstrate a gap in health promotion services for individuals with disability, setting the stage for inquiry about a potential role for health promotion within the VR system.

Employment for People with Disability

People with disability are employed at lower rates than individuals without disability and they work fewer hours. In 2005, people with disability experienced a 38.1% employment rate versus 78.3% for individuals without disability (StatsRRTC, 2005). Further, only 22.6% of people with disability were employed full-time (a minimum of 35 hours per week) versus 56.2% of people without disability (StatsRRTC, 2005). Full-time employment rates were even lower for individuals with physical disability (18.8%) and mental disability (14.2%) (StatsRRTC, 2005). Lack of full-time employment is an important consideration for people with disability, since part-time work is associated with lower wages and less access to health care benefits (Congressional Digest, 2007).

People with disability earn lower wages than people without disability, regardless of the number of hours worked. According to a study conducted by the Washington State Workforce Training and Education Coordinating Board (2005), the median hourly wage for people with disability was 77% of the hourly wage earned by people without disability -- a discrepancy that was consistent across education level.

Wage discrepancies may be a product of dual labor market theory, which says jobs are split between the primary (high wage, good benefits, stability, career growth opportunities) and secondary (low wages, poor benefits, instability, and no career growth) job sectors (Hagner, 2000). There is evidence that people with disability are employed in secondary labor markets at higher rates than people without disability. For instance, Lustig, Strauser, and Donnell (2003) found that VR clients who were closed to competitive employment (n = 1,326) were less likely to receive health insurance, paid

vacations, paid sick leave or to receive retirement benefits than individuals without disability in same sized establishments. Walls and Fullmer (1997) reported that 20% of VR closures to competitive employment were in a narrow range of secondary labor market jobs including janitor, attendant, cleaner, cook, and kitchen worker. Shafer, Banks & Kregel (1991) reported that 87% of employees in VR supported employment placements worked in food service or custodial positions. Analysis of data from the California Work and Health survey indicated that adults with disability were more likely to report episodic employment and involuntary part-time employment; and less likely to report optimal or traditional employment or promotion within a job as compared to adults without disability (Yelin & Trupin, 2003). This is problematic since long-term representation in secondary labor markets is self-perpetuating, whereby employees in low-skills jobs don't acquire transferable skills for job advancement (Hagner, 2000).

Unemployment and underemployment is even more pronounced for rural people with disability. In a study that examined employment outcomes for 2,031 VR consumers, Lustig, Strauser & Weems (2004) found that rural consumers with severe disability had lower employment outcomes than urban consumers, after controlling for gender, marital status, disability severity, age, ethnicity, education level, and working alliance with their vocational rehabilitation counselor. Johnstone, et al. (2003) report similar findings for a sample of adults with traumatic brain injury (n = 78). In part, they ascribe these differences to the lower rates of VR services provided to rural consumers.

Potential for job growth is also limited by lower rates of educational achievement. Data from the 2005 American Community Survey (ACS) show that 24.8% of people reporting disability had less than a high school education, 34.5% had a high school

equivalency, 28% had some college, and 12.8% had a BA or advanced degree. This is in contrast with people who did not report disability, where 11.5% had less than a high school education, 27.9% had high school equivalency, 30.5% had some college, and 30.1% had a BA or advanced degree (StatsRRTC, 2005). Since hourly wage rates have a positive correlation with education level (Washington State Workforce Training and Education Coordinating Board, 2005), education differences further exaggerate income discrepancies between people with and without disability.

Differences in terms of part-time and full-time employment rates, hourly wages, and education contribute to the \$26,500 median household income differential between people with and without disability and sheds light on issues of poverty (StatsRRTC, 2005). Data from the 2005 Status Report on Poverty Rate for the United States indicates that 24.6% of people with disability (age 21-64) experience poverty versus 9.3% of people without disability (StatsRRTC, 2005). Socio-economic differences also explain high eligibility into social insurance programs such as Medicaid to address health care needs. In a national telephone survey (n = 1,505) conducted by the Kaiser Family Foundation, 44% of respondents with disability reported Medicaid coverage, 43% reported Medicare coverage (with 16% receiving both Medicaid and Medicare) and 5% reported that they were uninsured (Hanson, Neuman, & Voris, 2003). Like employment, poverty issues are further exaggerated in rural communities. For instance, the “nonmetro rate has exceeded the metro rates every year since poverty was first officially measured in the 1960s” (Jolliffe, 2005, p.1).

Health Care for People with Disability

Economic hardship is compounded for people with disability because they often

incur high medical costs. Approximately 75% of the \$1.4 trillion dollars in U.S. medical care costs are consumed by people with chronic conditions (Centers for Disease Control, 2005). An analysis of 6,000 person years of data from the Medicare Current Beneficiary Survey Cost and Use files 1994-1996 showed that Medicare recipients aged 65 and younger with 2 or more limitations related to activities of daily living (ADLs) experienced medical costs that were two times greater than respondents reporting one or fewer limitations to ADLs (Foote & Hogan, 2001). Another national telephone survey of non-elderly adults (age 18-64) with physical and/or mental disability (n = 1,505) conducted by the Henry J. Kaiser Family Foundation showed that 57% of respondents had visited with a physician four or more times in the past six month period (Hanson, et al., 2003). DeJong, et al., (2002) report on data from the 1996 Medical Expenditures Panel Survey (MEPS). They found that people with functional disability made up 16 percent of the adult population but accounted for 34% of physician visits, 41% of prescriptions, 50% of hospital discharges, and 62% of nights in the hospital.

Unfortunately, access to medical care is a significant hardship for many individuals with disability. For instance, working aged adults with disability who are eligible for Medicare, but do not qualify for Medicaid, paid an average of \$2,000 per year in out-of-pocket expenses (Foote & Hogan, 2001). Further, Medicare beneficiaries with disability experience persistently high medical costs relative to high cost users from the aging population (Riley, 2007). These out-of-pocket costs are exaggerated for rural community dwellers due to increased driving distances to access care (Chan, Hart, & Goodman, 2006; Iezzoni, et al., 2006; Schur & Granco, 1999).

Steep out-of-pocket costs shape medical care utilization for adults with disability

because many individuals do not have disposable income to meet expenses. This outcome is evident when comparing reported medical care utilization rates between Medicaid enrollees, Medicare enrollees and the uninsured. The 2003 Kaiser study reported that “respondents with Medicare as their only source of coverage were more than 12 times as likely to have postponed care and were more than 7 times as likely to have forgone taking medications due to cost than were those enrolled in Medicaid” (Hanson, et al., 2003, p. 14). Likewise, two-thirds of uninsured respondents reported postponed medical care or inappropriate medication dosages to minimize out-of-pocket costs (Hanson, et al., 2003). Medicaid provides more comprehensive insurance coverage and, accordingly, it appears Medicaid enrollees access more timely care.

An analysis conducted by the Center for Studying Health System Change found similar trends in healthcare utilization. Data from the 2001 and 2003 Health Systems Change Community Tracking Study Household Survey projected that “among the 3 million uninsured, chronically ill people with medical bill problems, four in ten went without needed care, two in three put off care, and seven in 10 did not fill a prescription in the past year because of cost concerns” (Tu, 2004, p.1). This effect is increased for rural residents who access fewer health care services despite worse reported health status (Agency for Healthcare Research and Quality (AHRQ), 2005; Long, King, & Coughlin, 2006). Delayed medical care is a serious concern, because it can result in more serious health problems down the road (Tu, 2004). Congress has responded to this concern by eliminating copayments and deductibles for certain preventive and health screening tests within the Medicare program (Gordon & Lapin, 2001).

Secondary Conditions

The medical costs incurred by individuals with disability often relate to secondary health conditions. Secondary health conditions are health problems that are exacerbated or intensified by primary disability (Marge, 1988; Rimmer, 1999). Marge defines secondary conditions as "...those physical, medical, cognitive, emotional, or psychosocial consequences to which persons with disabilities are more susceptible by virtue of an underlying impairment, including adverse outcomes in health, wellness, participation, and quality of life" (Rimmer & Braddock, 2002, p. 221). For instance, people with spinal cord injury (primary disability) are at increased risk for secondary health conditions associated with sensation loss (such as pressure sores and urinary tract infection), sedentary lifestyle (such as weight problems, pain, and fatigue), and feelings of isolation (depression) (Marge, 1988; McDermott, Moran, Platt, & Dasari, 2006; National Center for Injury Prevention and Control, 2006; Rowland, White, & Wyatt, 2006).

In an analysis of 2001 Washington State Behavioral Risk Factor Surveillance Survey (BRFFS) data, Kinne, Patrick and Doyle (2004) found that disability was a significant predictor of 16 secondary conditions after controlling for age, gender, education, income, and health status. In comparison to people without disability, people with disability reported 2 to 3 times higher prevalence rates for chronic pain, sleep problems, fatigue, weight problems, depression, skin problems, muscle spasms, respiratory infections (not colds), falls or other injuries, bowel/bladder problems, anxiety, lack of romantic relationships, difficulty getting out in the community, problems making friends, feelings of isolation, and asthma (Kinne, et al., 2004).

Several studies support these findings. The 2003 Kaiser study reported that more than two-thirds of the non-elderly adult population with disability experience the secondary condition of depression (Hanson, et al., 2003). Data from the 1994-1995 National Health Interview Survey indicate that people with disability have higher rates of obesity (24.9%) as compared to people without disability (15.1%) (Weil, et al., 2002). Self-report data (n = 236) about the most prevalent and limiting secondary conditions among rural people with disability indicates that on average, people with disability experience 13 secondary conditions and that the most frequent secondary conditions include pain, depression, isolation, fatigue, sleep disturbance, weight problems, physical conditioning problems, mobility problems, access problems, contractures, spasticity, and communication problems. (Seekins, Clay, & Ravesloot, 1994).

Secondary conditions frequently result in acute medical episodes which are both costly and disruptive to an individual's participation in meaningful life roles. A study by the Medical Rehabilitation Research and Training Center (1998) that focused on hospital readmissions for adults with SCI, highlight the social and economic costs of some of these secondary conditions. Researchers used data from (1) personal interviews; (2) hospital admissions slips; and (3) Alabama Medicaid claims reports to develop average costs of hospital readmissions for adults with SCI from 1994 to 1996. Using 1997 dollars, the average cost of a single pressure sore episode was \$32,621 and resulted in 18.8 days in the hospital. Urinary tract infections cost an average \$12,238 with 8.1 hospital days per episode, and a bout of pneumonia cost an average \$12,419 with 5.6 hospital days (DeVivo, 1998).

Health Promotion Programs for People with Disability

While secondary conditions result in significant medical costs for people with disability, there is evidence that many of these conditions can be reduced or managed through health promotion efforts (Seekins, et al., 1994). The American Journal of Health Promotion defines health promotion as “the science and art of helping people change their lifestyle to move toward a state of optimal health... a balance of physical, emotional, social, spiritual, and intellectual health” (O’Donnell, 1989, p. 3). Health promotion includes a variety of programs that attempt to modify poor lifestyle habits into health promoting behaviors. Examples include fitness, nutrition, weight management, smoking cessation, and stress management programs (Goetzel, et al., 2007).

Secondary conditions such as physical deconditioning, fatigue, sleep problems, weight problems, pain, depression, and isolation are well-suited to health promotion behavioral interventions (Coyle, Santiago, Shank, Ma, & Boyd, 2000). In fact, Krause (1996) describes behavior as the most immediate risk (and protective factor) to the development (or management) of secondary health conditions for people with disability in his model of health risk factors.

The few articles that report on health promotion programs for individuals with disability demonstrate that participation results in favorable health outcomes. Unfortunately, this research is not substantive. One literature review conducted by Harrison (2006) found few rigorous health promotion intervention studies and a single randomized clinical trial.

Research about the Chronic Disease Self-Management Program (CDSMP) is considered one of the more rigorous evaluations of a health promotion program targeting

people with disability (Barlow, Wright, Sheasby, Turner & Hainsworth, 2002). The CDSMP includes seven weekly 2.5 hour sessions taught by two volunteer peer facilitators (Lorig, et al., 1999). Program content includes “exercise; use of cognitive symptom management techniques; nutrition; fatigue and sleep management; use of community resources; use of medications; dealing with the emotions of fear, anger, and depression; communication with others; problem solving; and decision-making” (Lorig, et al., 1999, p. 6). In a trial of the CDSMP program, a total of 1140 individuals with chronic conditions were randomly assigned to a treatment or control group (with the option to participate in the CDSMP after six months). Nine hundred and fifty two individuals (n = 561 treatment; n = 391 control) completed baseline and 6 month follow-up surveys.

At each data collection point, participants provided 6 month retrospective data about health behaviors, health status, and health care utilization. The intervention group reported significant improvements in health status and health behaviors including minutes per week of stretching and aerobic exercise, symptom management practices, and communication with their doctor. Rates of medical care utilization (as measured by hospital visits) were also lower for the intervention group. Lorig, et al. (1999) estimates that participant health care cost savings due to reduced hospital nights paid for the intervention ten times over.

Follow up studies about the efficacy and effectiveness of the CDSMP had similar results. The CDSMP has been replicated with another large sample (n = 489) (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001); compared with a targeted arthritis self-management program (Lorig, Ritter, & Plant, 2005); evaluated for use with Spanish

speakers (Lorig, Ritter, & Gonzalez, 2003; Lorig, Ritter, & Jacquez, 2005); and tested for delivery over the internet (Lorig, Ritter, Laurant, & Plant, 2006). In each of these studies, positive health outcomes in terms of health status, health behaviors, self-efficacy, and health care utilization were reported.

The *Living Well with a Disability* (LWD) program is another behavioral intervention that uses meaningful life goals as the impetus to improve health behaviors (Raveslout, Young, et al., 1998). Participants learn about goal setting, problem solving, healthy reactions, depression management, healthy communication, information seeking, physical activity, nutrition, advocacy and maintenance strategies in a workshop format. The LWD program is delivered by peer facilitators or community based agency personnel in eight weekly 2-hour sessions. Evaluation of the LWD program included a quasi-experimental pre-post design to examine program effectiveness in terms of health and cost outcomes. Self-report data about the prevalence and incidence of secondary conditions, healthcare utilization rates, health promoting lifestyle behaviors, and life satisfaction were collected at baseline, immediately following the LWD intervention, and then at 2-months, 4-months, and 12-months post- intervention. A total of 246 individuals with physical disability were recruited into the program and 188 completed baseline data and at least one post-intervention follow-up measure.

Health outcomes from the LWD program were evaluated using repeated measures analysis of variance. Participants reported significant decreases in the prevalence and severity of secondary conditions, significant decreases in reported Behavior Risk Factor Surveillance Survey (BRFFS) symptom days, significant increases in health promoting lifestyle behaviors, and significant increases in life satisfaction pre to post-intervention.

Further, significant pre to post results were maintained across the 2-month, 4-month, and 12-month post-intervention data (Raveslout, Seekins, & White, 2005). There were also significant reductions in healthcare costs pre to post intervention (Ipsen, Raveslout, Seekins & Seninger, 2006). Unfortunately, trends in reduced health care costs were not significant at 4-month and 12-month follow up measures. One implication from the study, however, is that access to health promotion programming for high medical care users may pay for itself in terms of reduced emergency and hospital visits.

Similar health promotion programs have been tested with specific disability populations. Intervention (n=71) and control (n = 62) group comparisons for a 20 hour patient education and exercise program focusing on people with fibromyalgia resulted in increased stretching and strengthening exercise and reduced doctor's visits for the intervention group (Hammond & Freeman, 2006). Pre to post comparisons between intervention (n= 31) and control (n= 30) groups for the 24 hour OPTIMISE health promotion program, targeting adults with MS, showed significant improvements in health promoting lifestyle behaviors, self-efficacy to engage in exercise, and health related quality of life for physical health, mental health and general health for intervention participants (Ennis, Thain, Bogglid, Baker, & Young, 2006).

Stuifbergen, Becker, Blozis, Timmerman, and Kullberg (2003) report favorable outcomes for their 12 hour *Wellness Program for Women with MS*. Pre to post, intervention participants (n = 56) reported more self-efficacy for health promotion, higher rates of health promoting lifestyle behaviors, and improved health related quality of life for bodily pain and mental health subscales relative to control group participants (n = 57). One outcome with relevance to this paper relates to employment. While there were no

between group differences in employment status at baseline, the intervention group was more likely to report being employed ($X^2 = 3.91, P < .05$) at an 8-month follow-up measure.

Zemper et al., (2003) reported on a randomized controlled trial of a 24-hour holistic wellness program for persons with SCI. Group comparisons (intervention = 23; control = 20) showed significant within-group differences from baseline to 7 months for the intervention group in terms of reduced limitation from secondary conditions, increased self-efficacy to engage in health promoting activities, increased health promoting lifestyle behaviors, and decreased levels of perceived stress (Zemper, et al., 2003).

Overall, results from these types of studies support the role of health promotion activities for people with varied physical limitations (Harrison, 2006; Lorig, et al., 1999; Ravesloot, et al., 2005); and for groups with specific diagnoses, such as multiple sclerosis, spinal cord injury, fibromyalgia, and arthritis. Outcomes from health promotion interventions targeting people with disability, however, are characterized as inconclusive (Barlow, et al., 2002; Harrison, 2006; Watt, Verma & Flynn, 1998).

Criticism of health promotion evaluations for people with disability stem from several factors. Design issues such as small sample sizes, lack of controls, and short extended baseline measures make it difficult to demonstrate meaningful effects for variables with wide variances (Barlow, et al., 2002; Ennis, et al., 2006; Hammond & Freeman, 2006; Harrison, 2006; Ravesloot, et al., 2005; Stuijbergen, et al., 2003; Zemper, et al., 2003; Watt, et al., 1998). This was the case for medical care utilization cost data collected as part of the Living Well with a Disability program (Ipsen, et al.,

2005). Cost data were highly variable, but trends pointed to huge cost savings for program participants. Similarly, two studies that measured physiological changes, such as bmi, cholesterol, heart rate, or endurance, could not report significant changes for the intervention group (e.g., Zemper, et al., 2003; Tate, Forchheimer, & Roller, 1998). Authors indicated that the brief data collection period made it difficult to detect substantial physiological changes.

Evidence from a longitudinal data collection effort conducted by Stuijbergen and Becker (2001) supports the assertion that health outcomes are best measured during a longer time horizon. They report that women with multiple sclerosis (n = 347) who engaged in higher rates of health promoting lifestyle behaviors over a 3 year period, also reported a lower level of decline in their health status. This was true for two cohorts including women with relapsing-remitting multiple sclerosis (n = 200) and women with chronic progressive multiple sclerosis (n = 147).

Data analysis issues, such as lack of statistical corrections for the number of tests conducted; lack of psychometrically tested measures, and lack of reported effect sizes (Barlow, et al., 2002) also undermine the validity of reported outcomes for many health promotion interventions. Lack of consistent outcome measures (Watt, et al., 1998) and economic cost-benefit outcomes (Barlow, et al., 2002) make it difficult to make meaningful comparisons between alternative programs.

Issues of self-selection or convenience sampling also bias results (Watt, et al., 1998; Ravesloot, et al., 2005). Further, self-report methods without appropriate triangulation from other data sources bring issues of reactivity or data reporting inaccuracies into question (Ennis, et al., 2006; Lorig, et al., 1999; Rowland, et al., 2006).

Unfortunately, this list of shortcomings within the published literature undermines the dissemination of health promotion programs that target people with disability.

Worksite Based Health Promotion

Health promotion studies for the general population have substantial evidence to draw upon (Pelletier, 1996; Pelletier, 2001; Pelletier, 2005). In part, this may be due to the controlled nature of worksite-based programs, where recruitment and delivery can be more targeted than community based programs (Ozminkowski, et al., 2002). Data collection can be more rigorous within a worksite setting since multiple data sources are available, including medical claims data through employer sponsored insurance carriers; participant rates of absenteeism, sick days, etc., available through payroll records, and self-report measures such as annual health risk appraisals. Employers have an added incentive to study promising health promotion programs to keep bottom line costs down (Chapman & Sullivan, 2003). The following descriptions provide a small segment of studies from the worksite health promotion literature.

Serxner, Gold, Anderson, & Williams (2001) examined the change in short-term disability days based on participation in an annual health risk assessment (HRA) and reimbursement program. Data analysis included 1,616 employee subjects who received short-term disability (STD) leave during the baseline year. Employees were assigned to the participant group (n = 450) if they self-selected to take a free annual health risk assessment program during year 1 or year 2 of the program. Non-participants (n = 1,166) did not participate in any health risk assessment. Three years of employer provided data (one baseline year and two follow-up years) were compared to assess change in STD days. At baseline, participants and non-participants had similar rates of STD days. At

year 1 and year 2, however, participants experienced fewer STD days per year than non-participants, after controlling for age, gender, job type, tenure, and short-term disability category. On average, across the two years of comparison data, participants experienced 6 fewer STD days than non-participants. Using cost savings from reduced STD days alone, this represented a \$396,000 cost savings to the company (Sexner, et al., 2001).

Ozminkowski, et al. (2002) evaluated long-term change in medical care costs after implementation of the Johnson and Johnson Health and Wellness Program (J&J HWP). Prior to program implementation, Johnson & Johnson employees had access to a variety of health and wellness services including health risk appraisal, program referrals, preventative health and screening services, health education, ergonomics and job conditioning, and drug and alcohol awareness training. Employee utilization of baseline health promotion programs was 26%. The new program focused on “changing individual behavioral and psychosocial risk factors instead of just focusing on symptom treatment.” (Ozminkowski, et al., 2002, p.22) and included a \$500 employee incentive to enter the program. This financial incentive increased program participation rates to 90% of employees. Eight years of claims data (measuring emergency room visits, outpatient or doctor visits, mental health visits, and inpatient days) were used in negative binomial fixed effects regression models to compare pre to post-intervention medical costs (adjusted to FY2000 dollars) for 18,331 employees of Johnson & Johnson. The average cost-savings per participant, per year, was \$224.66. Further, trends showed that cost saving increased over time from a low of \$91.99 per employee per year in Year 1 to \$413.10 per employee per year in Year 4.

Ozminkowski, et al. (2000) evaluated health outcomes for a health promotion

program targeting at-risk employees of Citibank Corporation. Employees who completed at least one baseline and one follow-up health risk appraisal were entered into the study (n = 9,234). All employees received personalized feedback from their health risk appraisal and written health education materials. Employees identified as high risk were invited to participate in the ACCENT health promotion program, which included more frequent health risk appraisals with targeted programming to reduce specific risk factors. High risk employees had specific health conditions (such as arthritis, back pain, high blood pressure, high body weight, asthma) or a combination of risk factors (such as stress, overweight, sedentary lifestyle, poor nutrition). Logistic regression was used to control for baseline differences between ACCENT participants and non-participants.

All participants (baseline HRA to post HRA) experienced significant reductions in risk factors related to seatbelt use, exercise, fiber intake, stress level, fat intake, salt intake, cigarette use, and high blood pressure. Similar findings were not evident for body mass index or cholesterol level. ACCENT participants versus non-participants experienced reductions in health risk factors (relative to non-participants) for exercise habits, seatbelt use, stress levels, and body mass index. Data reported in a related study indicated that for every dollar spent on health promotion at Citibank, the return on investment was between \$4.56 and \$4.73 in medical cost savings (Ozminkowski, et al., 2000).

Chapman (2005) conducted a meta-analysis of the worksite based health promotion literature. He evaluated the cost-effectiveness of 56 studies representing 483,232 participants. This combined evidence suggests that for each dollar spent in health promotion, there was a \$5.81 return in associated cost reductions. Approximately 70% of

the studies reviewed, however, used a single outcome variable (such as health care costs or rates of absenteeism) to evaluate economic outcomes. Chapman suggests that using only one outcome measure underestimates the full benefits of health promotion programming, since bottom line cost benefits may come from several sources (e.g. reduced insurance claims, lower rates of absenteeism, higher at-work productivity levels, etc).

Pelletier has conducted literature reviews about worksite health promotion and disease prevention programs since 1988. To date, he has critically reviewed 122 research studies, representing thousands of participants in a variety of work settings. Results from these multiple studies also point to favorable health and cost outcomes (Pelletier, 1996; Pelletier, 2001; Pelletier, 2005).

Pelletier makes critical assessments of the literature in each of his reviews. Some of his findings have implications for the future direction of health promotion programming. Pelletier indicates that multi-component programs, which address a variety of behavioral risk factors like stress, arthritis, pain, hypertension, or repetitive trauma, are more clinical-effective and cost-effective than single component programs, such as smoking cessation (Pelletier, 2001). He states “one major advantage of comprehensive, multi-factorial programs is that different employees can benefit from the same program in different ways by focusing on one particular risk factor such as controlling hypertension, reducing cholesterol, managing stress, or quitting smoking.” (Pelletier, 2001, p. 114). He also concludes that health promotion programs that are sustained for a longer duration (a minimum of 3 months) have better health and cost outcomes (Pelletier, 2001).

Pelletier also suggests that health promotion programs should target employees who are at risk of incurring higher medical costs (Pelletier, 1996; Pelletier, 2005). Studies show that the number of health risk factors correlates with health care costs (Aldana, 2001) and programs that target high risk employees typically report higher return on investment, relative to programs for the general worksite population (Pelletier, 2005). Pelletier notes that a shortcoming in the literature is a lack of discovery regarding health promotion outcomes for different sub-populations such as the working poor, racial or ethnic minorities, or retirees (Pelletier, 2001), since they may have more significant health risk factors. I would like to add the subpopulation of individuals with disability. Data from the Center for Medicare and Medicaid Services (2007) show that beneficiaries with disability cost Medicaid \$10,965 per year in medical costs as compared to \$1,725 for poor beneficiaries without disability.

Access to Health Promotion for Individuals with Disability

Despite “inconclusive evidence” regarding health promotion for people with disability, federal agencies have begun to promote health and wellness initiatives (Rimmer & Braddock, 2002). The Centers for Disease Control and Prevention, the National Institute on Disability and Rehabilitation Research, and the National Center on Birth Defects and Development Disabilities support research projects that evaluate health promotion for different sub-populations of individuals with disability (Rimmer & Braddock, 2002). *Healthy People 2010*, which outlines the U.S. Department of Health and Human Services’ (USDHHS) national health objectives, introduced a specific chapter on disability and secondary conditions (USDHHS, 2000). Health priorities set within Chapter 6: Disability and Secondary Conditions included the reduction in

disparities related to depression (6-2, 6-3), isolation (6-4, 6-5), satisfaction with life (6-6), and access to health and wellness programs (6-10). Unfortunately, access to wellness programs remains a significant issue for people with disability. These access issues pertain to a variety of factors related to the environment, health care insurance, and employment.

Environmental issues. People with disability face a variety of environmental barriers to accessing health promotion services. Some of these barriers include inaccessible space, social attitudes or stigmas, and a lack of disability awareness within the health and wellness field (DeJong, et al., 2002; Rimmer, et al., 2004). Others relate to community infrastructure, such as limited accessible and reliable transportation or curb cuts (DeJong, et al., 2002; Rimmer, et al., 2004). Infrastructure issues are exacerbated in rural communities, due to limited transportation options (Spas & Seekins, 1998) and scarcity of both primary care physicians and specialists. For instance, while rural communities include approximately 20% of the population, they only have access to 6% of the transportation funds and 9% of the pool of primary care physicians (AHRQ, 2005; Chan, et al., 2006; Spas & Seekins, 1998).

Rimmer, et al. (2004) conducted a qualitative study about barriers and facilitators to exercise in ten regions across the United States. Individuals with disability (n = 42) and fitness and recreation professionals cited lack of accessible exercise equipment, poorly maintained accessible equipment, and limited space for maneuverability between pieces of exercise equipment as significant equipment related barriers to exercise. Additionally, fitness and recreation professionals described “staff laziness, negative attitudes towards persons with disabilities, and concern about liability as major barriers”

(p. 423). Fitness personnel that are not trained to work with or assess individuals with disability was a barrier described in another study (Holland, Greenberg, Tidwell & Newcomer, 2003).

The literature also points to discrepancies between health care delivery for people with and without disability. For instance, in an obesity study using National Health Interview Survey data, researchers found that obese adults with mobility impairment (vs obese adults without mobility impairment) were less likely to receive exercise counseling (Weil, et al., 2002). Other data indicate that physicians may be “too disability focused in their interactions with people with disabilities, choosing to address disability-related health concerns during office visits and overlooking or skipping preventive services commonly offered to patients without disabilities” (DeJong, et al., 2002, p. 276).

Many standard health recommendations also ignore the unique needs of individuals with disability. FDA nutrition guidelines, for instance, are written for the general population in terms of nutrient and caloric needs. They may not be appropriate for individuals who use wheelchairs and may have significant loss of muscle tissue or for individuals who have specific nutritional needs for better management of secondary health conditions, such as conditions that promote bone loss, conditions which result in urinary tract issues, or treatments that come with medication side effects (Rimmer & Braddock, 2002).

Health care coverage of health and wellness programs. Federal support of health promotion initiatives has been limited (Haber, 2002). The editor of the American Journal of Health Promotion writes “health promotion is a centerpiece of the federal government’s health objectives for the nation....unfortunately, there is very little money

to support the health promotion initiatives in the plan. Health promotion receives very little of the \$17 billion NIH research budget and few health promotion procedures are covered by the \$400+ billion spent annually for Medicare and Medicaid” (O’Donnell, 2001, p. iv). Additionally, efforts to build the health promotion agenda have largely ignored people with disability. While racial, ethnic, and aging sub-populations receive designated monies for building health promotion initiatives, people with disability have not received similar support (DeJong, et al., 2002; Rimmer & Braddock, 2002).

Since many people with disability use Medicare and Medicaid as primary insurance (DeJong, et al., 2002; Hanson, et al., 2003; Kaye, 2001), lack of federal financial support of health promotion programming impacts both the demand for and supply of health promotion services. Federally mandated Medicaid services focus on the treatment of disease and there is only limited access to prevention services (Association of State and Territorial Health Officials -ASTHO, 2003; CMS, 2007).

Likewise, Medicare programs operate under Section 1862 (a) (1) (A) of the Social Security Act which says “no payment may be made under Part A or Part B for any expenses incurred for items or services which...are not reasonable and necessary for the diagnosis or treatment of illness or injury or to improve the functioning of a malformed body member” (Gordon & Lapin, 2001, p. 383). Although Medicare services have expanded to include preventive and screening services, coverage does not extend to behavior management activities for the most prevalent and preventable causes of morbidity and mortality, including sedentary lifestyle, poor diet, tobacco use, and alcohol abuse (Gordon & Lapin, 2001; Haber, 2001; Riley, 2007).

It is possible that access to health promotion services within Medicaid and

Medicare may improve as beneficiaries move to managed care alternatives (CMS, 2007, Gordon & Lapin, 2001). Uptake of the Medicaid managed care program has been significant, growing from 14% of beneficiaries in 1993 to 59% of beneficiaries in 2003 (CMS, 2007). If managed care programs pay attention to cost-effective health care delivery (CMS, 2007) it is likely that access to health promotion programs will grow for beneficiaries (Haber, 2002).

On the other hand, DeJong, et al., (2002) fears that managed care options will limit opportunities because physician gatekeepers will not prescribe health promotion services to individuals with disability. Prescribed services within managed care plans are typically based on medical necessity. DeJong, et al., writes “most definitions of medical necessity use an acute care model of health care and do not consider ongoing health and functional maintenance needs of individuals with disabilities...they recognize the need to restore function following the onset of a major disabling condition but do not recognize the need to maintain or enhance function in people with progressive conditions” (DeJong, et al., 2002, p.275).

Until health promotion services are covered with little or no financial obligation, available programs are likely to be underutilized by individuals with disability (Ackermann, et al., 2003; Casey, Call, & Klingner, 2001; Gordon & Lapin, 2001). Utilization of recommended preventive services, such as health screenings, correlate with insurance coverage (Faulkner & Schaffler, 1997) and socioeconomic status (Ross, Bernheim, Bradley, Teng, & Gallo, 2007). Uptake of health promotion programs are likely to correlate in the same manner (Ackermann, et al., 2003). This bodes poorly for people with disability who are not employed or are underemployed, and lack disposable

income to cover non-reimbursable services.

Additionally, there is evidence that cost of health promotion services plays into physician decision making. In a study about referral practices, researchers found that doctors referred low-income patients to health promotion clinics at higher rates if the health promotion programs were offered free of charge and/or the patient was employed (Bartlett-Prescott, Klesges, & Krichevsky, 2005). Another study found that physicians, who received a higher share of income from Medicaid, had fewer patients that received standard preventive care (Ross, et al., 2007). Undoubtedly, health insurance programs and providers shape health promotion access and delivery.

Employment issues. Currently, most health promotion activities are offered within a worksite setting at little or no cost to employees. Pelletier (1996) described results from a survey conducted by the US Department of Health and Human services that indicated work settings were the most important avenue for delivering health education and materials to adults. The 2004 National Worksite Health Promotion Survey further indicated that “health insurance or other managed care providers are the leading source of health risk appraisals, health screenings, lifestyle behavior change programs, and disease management programs offered by employers of all sizes” (Linnan & Birken, 2006, p.433).

Access to worksite based health promotion is generally limited to those who work and are covered by health insurance plans (Pelletier, 2001; Ross, et al., 2007) - a problem for people with disability who experience both unemployment and underemployment. Perhaps this is why Chapter 6: Disability Secondary Conditions of *Healthy People 2010* includes an objective to “eliminate disparities in employment rates between working-

aged adults with and without disabilities” (USDHHS, 2000, p 6-18).

DeJong, et al. (2002) state that “people with disabilities may require more complicated and prolonged treatment for a particular health problem than do people without disabilities....and may require a longer recovery period after an episode of acute illness” (p. 268). When individuals face overwhelming medical costs and prolonged absences from regular activities of living due to acute medical issues (DeVivo, 1998), stable employment becomes more difficult. There is evidence, however, that many acute medical issues that disrupt employment outcomes for individuals with and without disability arise from manageable health conditions (Barlow, et al., 2001; Crisp, 2005; Goldberg & Steury, 2001; Haugli, et al., 2003; Watson, et al., 2004).

In an analysis using data from the Behavioral Risk Factor Surveillance System (n = 3,076), Ipsen (2006) found that the probability for employment was higher for respondents reporting fewer secondary health conditions and for those reporting regular physical activity, after controlling for severity of disability and socio-economic and demographic characteristics. Likewise, Anderson and Vogel (2002) used structured interviews and qualitative measures to construct a predictive model of employment for adults with SCI. Significant predictors of employment included enhanced functional independence and decreased medical complications, two variables that are responsive to health promoting activities.

Evidence further suggests that the relationship between employment and health issues is bi-directional, whereby health issues contribute to poor employment outcomes and non-employment contributes to compounded health issues (California Wellness Foundation, 2000; Ross & Mirowsky, 1995; Voss, Nysten, Floderus, Diderichsen, &

Terry, 2004). If the later is true, people with disability who do not work are at a double disadvantage for acquiring secondary health conditions.

Simon, et al. (2000) studied 358 patients who were seeking medical assistance for clinical depression. Patients who reported improvements over one and two year periods also reported higher rates of employment and return-to-work outcomes, and fewer days of missed work.

In a mail based survey conducted by Linton and Bryngelsson (2000), researchers looked at the relationship between sleep and employment. The study included 2,100 respondents who reported good sleep (65%), poor sleep (27%) and insomnia (8%). People who were employed reported fewer sleep problems relative to those who were not employed; and a logistic regression that predicted sleep status, based on age, gender, employment status, work content, mental health, social health, perceived health, and disability, indicated that being employed was the most significant predictor of good sleep.

Data from the Canada Health Survey indicated that unemployed (vs employed) individuals report higher levels of psychological distress, anxiety, depression, health problems, short term and long-term disability, and hospital admissions, after controlling for demographic and socioeconomic factors (D'Arcy, 1986).

Using BRFSS data from Rhode Island, Jiang and Hesser (2006) used multivariate logistic regression to explore the relationship between employment and health factors. They found that being unemployed significantly increased the odds for poor general health (2.4 odds ratio), recent or frequent activity limitations (2.2 odds ratio), poor mental health (1.8 odds ratio), recent or frequent feelings of sadness or depression (1.9 odds ratio), recent or frequent feelings of anxiety (2.3 odds ratio) and a major depressive

episode (1.8 odds ratio).

Jin, Shah, & Svoboda (1997) conducted a literature review that focused on the impact of unemployment on a variety of health factors. They conclude that “the direction of causation from unemployment to illness is greater than the converse (illness causes unemployment)” (p.295). For instance, they report on a longitudinal study of factory workers laid off due to factory closure in Britain. Laid off factory workers had twice as many hospital admissions and higher rates of outpatient visits when compared to other working aged men. Jin, et al. (1997) also report that time series data show that adverse health outcomes follow increases in the unemployment rate.

Ross and Mirowsky (1995) report on longitudinal data (n = 2,436) from the National Survey of Personal Health Practices and Consequences – a two-phase telephone survey conducted in 1979 and 1980. They evaluated change in perceived health and physical functioning based on employment status, socio-demographic characteristics, and perceived health and physical functioning at baseline. Full-time employment predicted smaller declines in perceived health status and physical functioning compared to non-employment

This bi-directional relationship between health and employment amplifies the benefits of employment (Ross & Mirowsky, 1995). Employment not only provides the primary access point for health promotion and financial independence, but it also appears to be a protective factor against many manageable health conditions (Ross & Mirowsky, 1995).

Promoting Access for Individuals with Disability

People with disability who are not employed find themselves in a difficult

situation. They have limited access to health promotion services because they are not employed, and they have lower rates of employment due to secondary health conditions. One way to promote employment for this group, then, is to provide health promotion outside the work setting so that individuals can improve both their health and probability of employment (Ipsen, 2006).

There are many examples of community based health promotion programs. They are delivered through a variety of channels including centers for independent living (e.g. Living Well with a Disability), community based health centers, churches, and senior centers (e.g. the Chronic Disease Self-Management Program; Arthritis Self-Management Program), and university programs or hospitals (e.g. New Directions; NCPAD physical activity program). The availability of these programs, however, is limited to local geographies or specific pockets of the country (DeJong, et al, 2002).

Comprehensive delivery of health promotion for individuals with disability who are not working needs to be incorporated into the social systems they access, including Medicaid, Medicare, (Goetzel, et al., 2007; Ipsen, 2006) and Vocational Rehabilitation (Ipsen, 2006). The advantage of these types of delivery mechanisms is that programs would be available throughout the country and to all service areas. The Medicaid Home and Community Based Services (HCBS) waiver program is one such delivery mechanism. Currently, HCBS waivers provide financial support for cost-effective community based services delivered to individuals who are at risk for placement in institutional settings. HCBS services are based on three principles including “ (1) to preserve the maximum degree of independence possible for participants; (2) to maintain social ties to family and friends, and (3) to provide service options that enhance clients’

quality of life” (Fox & Kim, 2004, p 39). Although health promotion fits within these overlaying principles, it is not typically covered with waiver payments (Fox & Kim, 2004; Ipsen, 2006). Limited evidence about health promotion outcomes for individuals with disability make it difficult to demonstrate cost-neutrality and may limit program availability (CMS, 2004, Ipsen, 2006).

Expansion of coverage is also a possibility within the Medicare system. For instance, the Healthy Aging Initiative sponsored by the Centers for Medicare and Medicaid Services (CMS), supported demonstration projects to evaluate the effectiveness of health promotion programs that address behavioral risk factors for older adults (Goetzel, et al., 2007). As a result of one demonstration related to smoking cessation, Medicare now covers smoking cessation counseling for beneficiaries with smoking related illnesses (Goetzel, et al, 2007). Unfortunately, this coverage focuses on tertiary rather than secondary prevention¹ and does not extend to individuals who have not acquired smoking related illnesses, such as emphysema.

Another potential delivery mechanism might be the state and federal system of Vocational Rehabilitation (VR) programs, housed within the Rehabilitation Services Administration (RSA) at the U.S. Department of Education. In accordance with the Rehabilitation Act, RSA administers state formula grants to provide vocational rehabilitation services that assist people with disability prepare for and engage in gainful employment (U.S. Department of Education, 2004). This array of services includes assessment, counseling, referral, physical and mental restoration, training and education,

¹ Primary health promotion focuses on keeping people healthy. Secondary health promotion focuses on individuals who are at high risk for developing certain conditions. Tertiary health promotion is more closely aligned with disease management, or activities that help alleviate or manage conditions that have already developed (Goetzel, et al, 2007).

maintenance, and post-employment services (U.S. Department of Education, 2004; 34 CFR).

Section 103(a) of the Rehabilitation Act defines allowable VR services as “any services described in an 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 the strengths, resources, priorities, concerns, abilities, capabilities, interests and informed choice of the individual.” The Code of Federal Regulations provides additional guidance regarding the scope of allowable services for VR. Among these descriptions, the Code of Federal Regulations describes (1) allowable services for the treatment of physical impairments that includes “corrective surgery of therapeutic treatment that is likely...to correct or modify a stable or slowly progressive impediment to employment... and physical and occupational therapy” (Section 361.5 Applicable Definitions) and (2) services for vocational or other training that include personal and vocational adjustment training (Section 361.48(f) Applicable Definitions).

Given evidence about the relationship between health and employment, health promotion services appear to fit within the Rehabilitation Act’s overarching definition and more specifically within the Code of Federal Regulations’ specifications for VR. For instance, participation in health promotion activities might be considered therapeutic treatment if it can stabilize a physical impairment that is a substantial impediment to employment. Likewise, participating in an exercise program may have the same benefits as physical or occupational therapy and could also be considered personal or vocational adjustment training to help an individual prepare for work.

There have been some small research studies that focus on reducing secondary health conditions as a strategy to enhance work outcomes. Haugli, et al. (2003) reported on a program designed to increase coping strategies for individuals experiencing significant pain. Participants were included in the study if they experienced pain more than several days per week during the past 6 months and missed over 4 weeks of work over the past year. Participants were randomly assigned to a control group or intervention group. The control group (n = 44) received typical physician services. The intervention group (n = 74) received typical physician services and participated in an educational program taught by group counselors that met 4 hours every other week for a total of 48 hours. Program content focused on building personal resources, coping strategies, and self-confidence.

Data about psychological distress, pain, and work status were collected at baseline, 1 month post-intervention, and 1 year post-intervention. Group comparisons showed a significant decrease in psychological distress (.33 effect size) and pain (.28 effect size) for the intervention group. There was also a significant group by work status interaction, indicating that reductions in psychological stress and pain may help to keep individuals with chronic pain in the workforce (Haugli, et al., 2003).

Watson, et al., (2004) used a pre-post quasi-experimental design to examine the effectiveness of a pain management program with the goal of returning-to-work. Their program was delivered in 12 sessions across 6 weeks to assist participants to identify and address barriers to seeking and going back to work. In addition to specific work advice delivered by a vocational rehabilitation counselor, the program included a physical activity component delivered by a physical therapist. Participants were referred by the

UK State Disability Employment Advisors and self-selected into the research study. Inclusion criteria included symptoms of low back pain lasting 6 months or longer, unemployment greater than 6 months, and receipt of disability or unemployment benefits.

Data for the research participants (n = 86) were collected at baseline, 3-months post-intervention, and at 6-months post-intervention. At the 6-month follow-up measure, 38.4% of participants were employed and 23% were participating in education, training, or volunteer work. A logistic regression predicting employment outcomes indicated that negative employment outcomes (no employment, education, training, or volunteer work) were associated with longer duration of unemployment prior to the intervention, and higher rates of depression and anxiety (Watson, et al., 2004)

Barlow, et al. (2001) conducted a pre-post quasi experimental study with an intervention and comparison group to explore the INTO WORK Personal Development (IWPD) program targeting individuals with arthritis. The IWPD program consisted of five 3-5 day workshops that covered the social model of disability, choice making skills, and essential work skills. The content focused on barriers to work and how individuals could work around barriers through goal setting and action planning. While the workshop content did not specifically focus on secondary conditions, the express goal of the program was to assist individual with arthritis to overcome barriers related to “pain, fatigue, limited physical functioning, uncertainty, extensive treatment demands and vulnerability to psychological distress” (Barlow, et al., 2001, p. 206).

A self-selected intervention group (n = 37) and comparison group (n = 42) completed baseline and 6 month follow-up measures using both quantitative and qualitative methods. Quantitative measures were used to evaluate anxiety, depression,

positive and negative affect, self-esteem, life satisfaction, generalized self-efficacy, and self-efficacy related to job seeking. With the exception of job seeking self-efficacy, group comparisons of change scores showed significant improvements for the intervention group for each quantitative measure (Barlow, et al., 2001).

Focus groups were used to learn about expectations, perceived barriers, and personal goals for intervention participants. Focus group participants talked about a variety of personal goals including “attempt to plan and structure activities and daily living, to socialize more, to join a local group of people with arthritis, to improve skills in meditation, to lose weight, and to exercise more.” (Barlow, et al., 2001, p. 213) and demonstrated an understanding about the relationship between health and employment. Unfortunately, the authors did not include a work related outcome measure in this study.

Although these studies provide a precedent for including health promoting activities within a vocational rehabilitation setting, few studies have been conducted within the United States. A literature review accessing 63 literature databases in the social sciences and using the search terms (1) rehabilitation and health promotion; (2) vocational rehabilitation and health promotion, (3) vocational rehabilitation and intervention program, and (4) vocational rehabilitation and physical activity resulted in eight relevant articles, all conducted outside the United States. It is likely that access to health promotion within the vocational setting is constrained by limited evidence about the relationship between health and employment for VR clients, representing a gap that this research might address.

Conceptual Models of Health and Disability

Within the medical model of disability, health status is described in either/or

terms. In the absence of illness, chronic condition, or disability a person is considered 'healthy.' Conversely, individuals experiencing illness, chronic conditions or disability are considered "unhealthy" (Becker, 2006). This framework has shaped the delivery of medical care to individuals with disability by focusing on medical cures and treatment of acute health care episodes, rather than health promotion. Teague, Cipriano, & McGhee (1990) describe the influence of the medical model.

Federal efforts in health promotion and disease prevention, as described in the 1990 Health Objectives for the Nation Report, focus on primary prevention for the general, nondisabled population and strategies that promote and maintain health among people already healthy.

Unfortunately, specific attention to prevention strategies for people with disabilities has not received sufficient attention. Health maintenance objectives have been largely ignored since many health providers fail to distinguish between primary and secondary disability (p. 54).

While the influence of the medical model is diminishing, it is entrenched in the delivery mechanisms of many social insurance programs, including Medicare and Medicaid.

The social model of disability fits within the new paradigm of disability. The social model defines disability in terms of an interaction between a person and his or her environment (Becker, 2006, World Health Organization, 2001). If full accommodations are met within the physical, social, and political environment, an individual will not experience disability or limitation. Environmental barriers such as lack of access to health promotion, however, impose or promote disability. The social model of disability has roots in the civil rights movement, whereby societal discriminations and unequal

treatment contribute to class differences. In this way, disability is a demographic descriptor rather than a health indicator (Becker, 2006), and systematic health differences between people with and without disability point to differences in access within the environment.

The distinction between health and disability is described in the literature. Oswald and Powers (2003) report on interview data from 19 focus groups consisting of people with long-term disabilities to understand how individuals define their own health and wellness. Study participants identified four areas that contribute to their self-perceived health including (1) ability to participate in the community, (2) exercising independence and choice, (3) being emotionally and physically well, and (4) not limited by pain.

Self-rated health as distinct from disability is an important consideration, since it is a strong predictor of morbidity and mortality. In a literature review of 27 community based studies, Idler & Benjamini (1997) found that global ratings of health (e.g. would you say your health in general is excellent, very good, good, fair, poor) consistently predicted morbidity and mortality outcomes, after controlling for a variety of health and demographic indicators including medical utilization rates (e.g. physician visits, hospitalizations, medications), diagnostic data (e.g. physician diagnoses, nurse evaluations), physiological health data (e.g. bmi, blood pressure, cholesterol), disability (e.g. self reports of chronic conditions, functional disability, cognitive functioning), health conditions (e.g. pain, stress, incontinence, heart disease), health risk factors (e.g. smoking, health practices, physical activity, family history, social support networks, hopelessness), and socio-demographic characteristics. Further, 13 of the 27 studies found

that higher global ratings of health correlated with better self-care behaviors.

Most studies focus on morbidity and mortality to evaluate outcomes. Research by Crews (personal communication, June 12, 2002), however, evaluated global health ratings in terms of employment outcomes. Using data from the Behavioral Risk Factor Surveillance System, Crews found that higher global ratings of self-reported health predicted employment outcome, after controlling for disability severity. Undoubtedly, efforts to improve real and perceived health are important to the participation of people with disability.

Rimmer (1999) describes health as a continuum. People start at different places on the health continuum, and can move towards better health or towards worse health based on health behaviors. People who start at the lower end of the health continuum (such as individuals that experience multiple health risk factors or secondary conditions), have the opportunity to achieve significant health gains by engaging in health promoting behaviors. Evidence for this outcome appears in worksite studies that find people with multiple health risk factors experience the most health gains from participation in employer sponsored health promotion programs (Pelletier, 2005).

Conceptual Models of Health Promotion

As the literature demonstrates, health is more complex than the medical model suggests. Health is characterized by a variety of factors including physical and psychological well-being, ability to fulfill meaningful life roles, and participation in community activities (Becker, 2006). As such, the definition of health promotion should be comprehensive. Pender defines health promotion as “behavior motivated by the desire to increase well-being and human health potential.” Ardell defines health promotion in

more specific terms by highlighting the multiple aspects of health promotion including “physical elements (exercise and nutrition), psychological aspects (stress management and emotional intelligence), social and intellectual elements (connectedness to significant others and passionate ideas), and spiritual components (seeking meaning and purpose in life) (Haber, 2002, p. 72). This more holistic definition is captured in the Health Promoting Lifestyle Profile II (HPLP-II) developed by Walker, Seschrist, & Pender (1995).

Stuifbergen (1995) built on the earlier work of Pender to develop a conceptual model of health promotion. Her model suggests that barriers (such as limited access to health promotion activities), resources (such as social supports or finances), perceptual factors (such as self-efficacy or beliefs), and demographic and disease characteristics influence health promotion behaviors, which then impact overall quality of life.

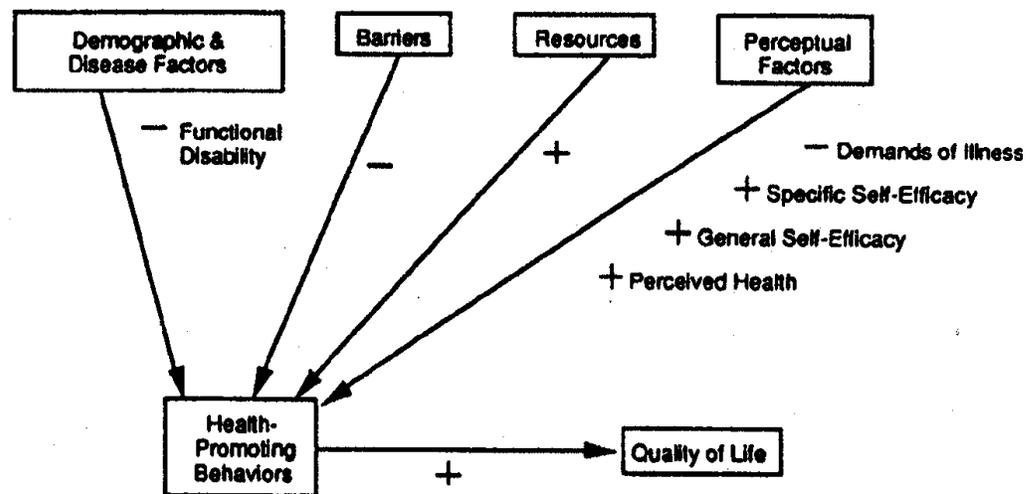


FIGURE 1. Preliminary Model and Predicted Relationships.

To test this model, Stuifbergen (1995) collected data from adults with multiple sclerosis (n = 61). Multiple regression was used to evaluate how antecedents (resources

and perceptual factors) and health promoting behaviors correlated with perceived quality of life. Four variables measuring self-efficacy for health practices, financial resources, emotional supports, and health promoting behaviors explained 69% of the variance in the quality of life dependent variable. After qualitative interviews with 20 individuals with multiple sclerosis, Stuifbergen and Rogers (1997) further refined this model to include “acceptance of disease” as a moderating variable.

Devins & Shenk (2000) and Roessler (2004) developed the illness intrusiveness model to describe the role of rehabilitation in shaping disability outcome. Illness intrusiveness is defined as “ the losses or barriers associated with the disease and its treatment that negatively affect the individual’s participation in valued life roles and acquisition of personal satisfaction” (Roessler, 2004, p.23). In this model, illness intrusiveness is shaped by a variety of factors including disease factors (e.g., pain, fatigue, or functional limitations), treatment requirements (e.g., tests, doctor visits, time or costs), and rehabilitation interventions (such as disease self-management or problem-solving skills development). Illness intrusiveness, in turn, is the mediating factor for feelings of personal control (e.g., self-efficacy, self-determination) and life outcomes (i.e. employment, independent living, depression, isolation). Further, disease factors, treatment requirements, and life outcomes are influenced by psychological and social characteristics of the person (such as personality, negative or positive affect, socioeconomic status, gender, age, etc.). Figure 2 shows the illness intrusiveness model as developed by Devins and Shneck (2000).

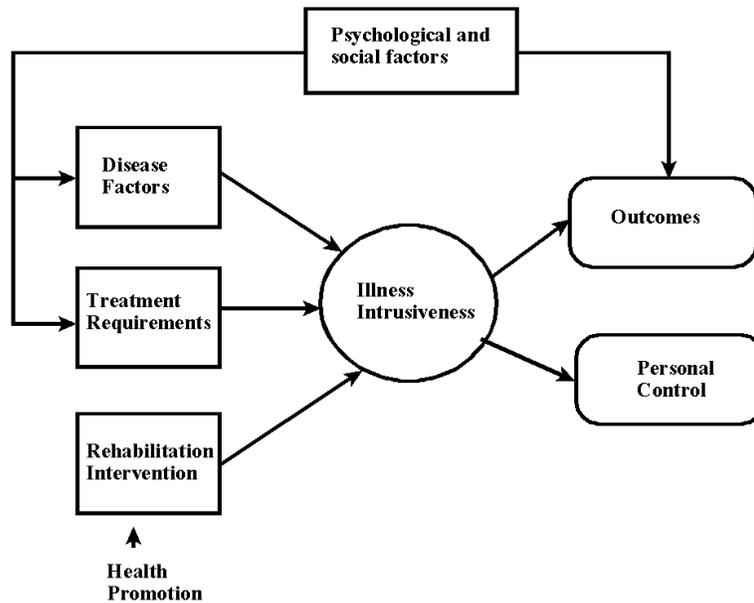


Figure 2: Illness Intrusiveness Model

The illness intrusiveness model provides a visual representation of the role that health promotion programming might play within the rehabilitation context to promote meaningful life outcomes. I would argue, however, that health promotion interventions could impact more than illness intrusiveness itself. For instance, health promotion activities are (1) likely to impact disease factors and associated treatments that arise from secondary health conditions, (2) impact the personal control that people exercise over their own health and well-being, and (3) may even affect psychological factors, such as positive affect. At the very least, health promotion is likely to benefit rehabilitation efforts at home, in the community, and the workplace.

Purpose of the Study

Building on the illness intrusiveness model, the following research begins to explore the feasibility of offering health promotion within a vocational rehabilitation context. It extends a long line of research that began with the investigation of the

incidence and prevalence of secondary conditions in the population of adults with physical disability. Subsequent RTC:Rural research showed that many adults with physical disability experience a variety of secondary conditions that might be managed through improved health behaviors or better self-management (Raveslout, Seekins, & Young, 1998; Raveslout, Seekins, & Walsh, 1997; Seekins, et al., 1994; Seekins & Raveslout, 2000).

Building on these findings, RTC:Rural researchers developed the curriculum for a 16 hour health promotion program aimed at adults with mobility impairments (Raveslout, et al., 1998). The program, *Living Well with a Disability*, was designed for delivery in 8 weekly 2 hour sessions by peer facilitators. A national trial of this program was conducted in 9 states. A total of 34 replications of the *Living Well* program were conducted with 246 adults with mobility impairments. As described earlier in the introduction, participants experienced a variety of favorable outcomes from participating in the *Living Well* workshops including reductions in reported secondary conditions, fewer days of limitation, and lower medical utilization rates (Ipsen, et al., 2006; Raveslout et al., 2005).

The *Living Well* program continues to be utilized within the CIL network and in the public health arena. To date, over 300 peer-facilitators have been trained to implement the *Living Well* program, representing 131 organizations in 31 states (Seekins, personal communication, September, 19, 2007). The *Living Well* program has also been modified for different audiences (e.g. transition aged youth, Spanish speaking adults with physical disabilities) and using different delivery mechanisms (e.g. web based facilitator and participant training).

This research, called *Working Well*, provides the basis for another translation of *Living Well* for application within the Vocational Rehabilitation (VR) setting. Because VR dollars must be allocated to services which positively impact work outcomes, however, a relationship between health and employment needs to be established. The purpose of this study is to evaluate this relationship between health and employment using a longitudinal design.

Methods

The *Working Well* research was designed to track health and employment data for VR clients over an 18 month period. It was anticipated that study participants provide data at baseline (when they enter the VR program for employment services), and at 6-months, 12-months, and 18-months to track employment outcomes as a function of presenting health conditions and health promoting behaviors.

Procedures for Participant Selection

Participant recruitment was conducted in ten states, representing eight out of ten federal regions utilized by the Rehabilitation Services Administration. Prior approval to conduct this research within the VR system was received from the research committee of the Council for State Administrators of Vocational Rehabilitation. State VR administrators from Alabama, Arkansas, California, Colorado, Idaho, Iowa, Nevada, Utah, Vermont, and Wisconsin agreed to participate in the project.

Each state VR administrator identified a point contact within their state and helped to identify 3-4 local VR offices to serve as participant recruitment sites. A mix of northern and southern tier states, as well as rural and urban VR offices were selected to provide geographic representation. Conference calls were conducted with local supervisors at each identified VR office to describe the project, explain recruitment procedures, and answer questions. After this administrative call, each office was sent 15 recruitment packets for counselors to use with prospective participants.

Each recruitment packet contained counselor recruitment instructions and baseline data collection materials. The counselor instructions included specific inclusion criteria for participant selection and step by step directions for the counselor to follow when

recruiting. Data collection materials included a participant information and consent form; the first baseline health survey; a \$5 participant cash stipend, and a postage paid envelope for returning materials to the University of Montana. A complete recruitment packet is contained in Appendix A.

VR clients were eligible to participate in the project if (1) their primary disability related to a physical or mobility impairment; (2) they were between the ages of 21 and 65, (3) they had been accepted to receive Vocational Rehabilitation services, and (4) were within 6 months of entering the VR system.

Based on a priori power analyses, a sample size of approximately 270 participants was desired to detect statistical group differences assuming a power of .80, an alpha level of .05, a small to medium effect size of .35 Cohen's d^2 and with unequal samples (Faul, Erdfelder, Lang, Buchner, 2007). We hoped to recruit a total of 450 VR consumers into the study to protect against attrition concerns from the longitudinal data collection design. Past longitudinal studies of people with physical disabilities report a 20-25% attrition rate over time (Ravesloot, et al., 2005; Zemper, et al., 2003).

Attrition is a concern for studies of VR clients because they share characteristics with typically harder to reach groups (Young, Powers & Bell, 2006). In particular, the VR client population has disability, tends to be more transient, has lower levels of education, lower income, and worse health than the general population (Young, et al., 2006, Rehabilitation Services Administration - RSA, 2006).

This target of 450 study participants required recruitment of 45 individuals in each state – or approximately 15 clients from each identified local VR office. Due to

² Cohen's d is defined as the difference between the two means divided by the pooled standard deviation for the means (Cohen, 1992).

lower recruitment numbers than expected, some states increased the number of participating offices (i.e. Colorado, California, & Idaho). Additionally, recruitment was extended over a longer period of time to increase overall participation rates. Despite these efforts, recruitment levels did not meet expectations, particularly in small rural states (e.g. Vermont) and states under order of selection³ (e.g. Wisconsin). A total of 264 VR clients provided baseline health data. The following table provides recruitment levels by state.

Table 1: Recruitment levels by state

<i>State</i>	<i>Recruitment</i>
Alabama	28
Arkansas	21
California	23
Colorado	25
Idaho	30
Iowa	32
Nevada	44
Utah	29
Vermont	15
Wisconsin	17

Informed Consent and Confidentiality Issues

This research project was subject to a full Institutional Review Board (IRB) review because the study population included a “physically, psychologically, or socially vulnerable” population given disability status requirements for eligibility into VR services (University of Montana, 2002, p.6). Research protocols were described in an 11-

³ States under order of selection do not have funds available to support the entire roster of clients who are eligible to receive VR services. As a result, clients are ordered based on the severity of their disability, and are served from those requiring the most intensive services to those requiring the least intensive services. VR programs under order of selection serve far fewer clients because the average costs per client are higher.

point summary and approved by the University of Montana's Institutional Review Board. Researchers involved with this project completed the required self-study course in human subjects protection. Submitted IRB materials and Human Subjects Protection Course certifications are included in Appendix B.

By signing the Participant Information and Consent Form, study participants permitted researchers to store and use participant data, re-contact participants at six month intervals to request additional data, and to access participant VR case records regarding cost of VR services and employment and training outcomes. Participants could withdraw from the study at any time and have their data excluded from analyses. Although several participants did not return one or more longitudinal survey measures, only one participant asked to be removed from the study.

Participants were paid a \$5 cash stipend each time they received a survey. Participants received the stipend whether or not the survey was returned to the University of Montana, per IRB guidelines.

Follow-up Procedures

Participants who agreed to participate in the study completed the informed consent form and the baseline survey instrument at the Vocational Rehabilitation office and returned it to the Rural Institute in a return postage paid envelope. Upon receipt, surveys were assigned a tracking number and were separated from the informed consent forms.

Participants were mailed follow-up surveys at 6-months, 12-months, and 18-months from the time the baseline survey was received at the Rural Institute. Follow-up surveys were mailed to a participant's home with an instructional cover letter, a five

dollar stipend, and a return postage paid envelope. If a survey was not returned within two weeks of a mailing, a telephone call reminder was made. If a message was left or there was no answer, two additional follow-up calls were attempted. All survey materials were sent first class so that undeliverable packets were returned for tracking purposes.

In some cases, surveys were returned with sections of missing data that indicated the respondent had missed a page or pages (versus deliberately skipping a question). In these cases, the respondent was sent a follow up letter, a postage paid envelope, and blank survey pages that corresponded to the questions they did not complete. This practice was included to maintain the integrity of data, particularly for established measures such as the Secondary Conditions Surveillance Instrument, that rely on aggregated scores for comparisons.

Sample Demographics

A total of 264 consumers of VR services provided baseline data. The average age of respondents was 43 years and 47.7% were male. Most respondents were Caucasian (79.8%) or African American (13.0%), with additional Hispanic (3.8%), American Indian (1.5%) and Asian (1.5%) representation. In general, the sample was more educated than the general population of adults with disability (US. Census Bureau, 2006b). Responses indicated that 25.5% of the sample graduated from high school, 52.1% had some college education, and 15.2% graduated from college. Approximately half the sample came from a metropolitan area (51.9%) and half the sample came from a rural (20.1 %) or micropolitan (28%) area⁴.

⁴ Geographic designations are based on the Office of Management and Budget definition. Metro areas are defined as “(1) central counties with one or more urbanized area and (2) outlying counties that are economically tied to the central counties as measured by work commuting.” Nonmetro counties are

Respondents reported lower rates of health care coverage than the general population or the sub-population of individuals with disabilities (Hanson, et al., 2003). Overall, 29.7 % of VR respondents reported that they were uninsured. Insured respondents used Medicare (27.8%), Medicaid (26.6%), private insurance (27.0%), and veterans benefits (3.8%). Many respondents reported dual coverage. For instance, 8.9% of respondents reported both Medicare and Medicaid coverage. Additionally, 36.0% of respondents reported receiving Supplemental Security Income (SSI), Supplemental Security Disability Insurance (SSDI) benefits, or both.

At baseline, the majority of respondents (69.4%) were not working. Individuals not working identified themselves as not currently employed (51.1%), student (15.6%) or homemaker (2.7%). Respondents that were employed reported part-time (17.9%) and full-time (12.6%) work.

Issues of Attrition

Due to the longitudinal nature of the study, attrition was a factor in the final sample size. Of the 264 respondents who provided baseline data, 162 respondents returned 18-month follow up data and 140 returned follow up data at all data collection points (baseline, 6-months, 12-months, and 18-months). Table 2 reports on data tracking measures. Follow-up surveys were not mailed to individuals who requested non participation, had bad addresses, did not return a survey and could not be reached due to a disconnected telephone, or did not return two consecutive surveys.

subdivided into micropolitan and rural areas – “centered on unbanized counties of 10,000 or more persons and all remaining counties” (North Dakota State Data Center, 2008, p.3)

Table 2: Data tracking

<i>N = 264 at baseline</i>	<i>6-month follow-up</i>	<i>12-month follow-up</i>	<i>18-month follow-up</i>
Surveys mailed	264	239	203
Surveys returned	195	183	162
Return rate based on number sent	73.9%	76.6%	79.3%
Did not reach (e.g., left message, no answer, or could not get through because line was busy or too many messages in inbox)	24	32	16
Did reach but survey not returned	9	6	8
No phone number or wrong number provided on informed consent form	11	9	3
Will not participate *	1	0	0
Bad address *	15	4	7
Disconnected telephone*	9	5	7
Missed 2 consecutive surveys *	NA	27	NA

* did not send follow-up surveys to individuals that (1) did not want to participate, (2) did not have a valid address, (3) had a phone that had been disconnected, or (4) did not return two consecutive surveys.

To compare demographic differences between completers and non-completers, I used the subsample of individuals who returned the final data collection instrument at 18-months. Group differences for completers (n=162) vs non-completers (n=102) were evaluated for demographic and health status variables.

Cramer's V statistics were used to evaluate differences for nominal data. No statistically significant group differences were found for marital status ($V = .194$; $p = .079$), race ($V = .147$, $p = .343$), employment status ($V = .109$; $p = .538$), education ($V = .163$; $p = .135$), or geographic location ($V = .093$; $p = .318$). Proportions in each category are reported in Table 3.

Table 3: Group comparisons – completers vs. non-completers

<i>Variable</i>	<i>Completer (n = 162)</i>	<i>Non-Completer (n = 102)</i>
Married	40.1 %	41.6 %
Divorced	26.5 %	26.7 %
Widowed	2.5 %	2.0 %
Separated	3.7 %	7.9 %
Never married	26.5 %	16.8 %
Unmarried couple	.6 %	5.0 %
Caucasian	81.5 %	77.0 %
African American	11.1 %	16.0 %
Hispanic	3.7 %	4.0 %
American Indian	1.2 %	2.0 %
Asian	2.5 %	.0 %
Not currently employed	49.7 %	54.5 %
Employed full-time	13.7 %	9.9 %
Employed part time	16.8 %	19.8 %
Homemaker	3.7 %	1.0 %
Student	16.1 %	14.9 %
K-8	.6 %	1.0 %
Some high school	3.7 %	10.9 %
High school graduate	24.1 %	27.7 %
Some college	54.3 %	48.5 %
College graduate	17.3 %	11.9 %
Urban	51.2 %	52.9 %
Micropolitan	25.9 %	31.4 %
Rural	22.8 %	15.7 %

Because individuals could elect more than one source of health care coverage, group differences were analyzed for each health insurance option. Health insurance coverage rates were similar for Medicaid (26.5% vs. 26.7%; $V = .002$; $p = .973$), Medicare (27.8% vs. 27.7%; $V = .001$; $p = .992$), private health insurance (30.2% vs. 22.8%; $V = .082$; $p = .186$), veterans benefits (5.6% vs. 1.0%; $V = .116$; $p = .060$) and for those with no health care coverage (27.2% vs. 32.7%; $V = .059$; $p = .339$). Independent samples t-tests indicated that completers were slightly older (44.4 vs. 41.4; $t = -2.248$, $p = .035$) than non-completers.

In terms of baseline health indicators, completers reported fewer days (per month) of limitation related to mental health (8.26 vs. 11.84; $t = 2.770$, $p = .006$), depression (8.59 vs. 11.80; $t = 2.504$, $p = .013$), and anxiety (11.81 vs. 14.97; $t = 2.373$, $p = .018$). Overall, it appears that completers had better mental health indicators. On the other hand, differences were not apparent for physical health. Group differences were not statistically significant for (1) days of limitation due to poor physical health (11.80 vs. 12.41; $t = .472$, $p = .637$) (2) days of limitation related to pain (12.80 vs. 14.86; $t = 1.477$, $p = .141$), (3) body mass index (30.13 vs. 30.15; $t = .023$, $p = .981$), or for (4) days per week of moderate (3.30 vs. 3.41; $t = .387$, $p = .699$) and vigorous exercise (1.31 vs. 1.35; $t = .134$, $p = .893$).

Unfortunately, VR outcomes cannot be assessed over time for non-completers. This is disappointing because past research indicates that mental health indicators such as depression and anxiety are predictive of worse employment outcomes (Crisp, 2005; D'Arcy, 1986; Sherbourne, Hayes, & Wells, 1995; Samkange-Zeeb, Altenhoner, Berg, & Schott, 2006).

Measures

Participant data were collected at four points in time. The following questions were included at one or more data collection points.

Demographic variables. A variety of demographic variables have been linked to health and employment outcomes for individuals with disability. These include (1) *individual characteristics* such as age, gender, race, and marital status (Crisp, 2005; Ipsen, 2006; Tan, Cheatle, Mackin, Moberg, & Esterhal, 1997), (2) *socioeconomic factors* such as employment status, health care coverage, and receipt of financial

assistance such as SSI, SSDI, Ticket to Work, Worker's Compensation, and income (Crisp, 2005; Drew, et al., 2001; Kennedy & Olney, 2006), and (3) *geographic characteristics* such as rural/urban location (Casey, et al., 2001; Chan, et al., 2006; Johnston, et al., 2003; Joliffe, 2005; Long, et al., 2006; Lustig, et al., 2004;). Respondents provided data about each of these demographic characteristics.

In addition, several questions focus on assessment of a respondent's disability severity. Data from the Survey of Income and Program Participation (SIPP) indicate that severity of disability has a negative relationship with employment (McNeil, 2001). The SIPP identified individuals with severe disability according to the following definition.

People of age 15 and over were identified as having a severe disability if they were unable to perform one of more functional activity; needed personal assistance with an activity of daily living (ADL) or instrument activity of daily living (IADL); used a wheelchair; were a long-term user of a cane, crutches, or a walker; had a development disability or Alzheimer's disease; were unable to do housework; were receiving federal disability benefits; or were 16-67 years old and unable to work at a job or business. (McNeil, 1997).

Building on this definition, 4 items from the BRFSS Quality of Life and Care Giving Module were used to measure disability severity and functional limitation for the population of VR clients. These include yes/no questions for (1) limitation in activity because of any impairments or health problem; (2) required assistance from others to fulfill personal care needs (such as getting out of bed, eating, or bathing); (3) required assistance from others to perform routine daily activities (such as shopping or everyday

household chores); and (4) the required use of special equipment (such as a cane, wheelchair, or communication device). Data about developmental disabilities or Alzheimer's disease were not collected because the sample was recruited from a population of individuals with physical disability. Items to assess severity of disability are meant as control factors when examining variations in employment status, health status, and health promoting behaviors.

Employment and Vocational Rehabilitation services. Employment status is the primary outcome variable of this research. Respondents gave their employment status at each data collection point, including participation in work related education and training programs. If respondents said that they were employed part-time or full-time, they answered follow up questions regarding length of employment and work absences in the last month due to a health problem. Likewise, if respondents said they were currently participating in a work related training or education program, they answered follow-up questions about how many months they have been participating and days missed in the last month due to a health problem. One of the primary outcomes of participation in worksite based health promotion programs is reduced rates of employee absenteeism (Aldana, Merrill, Price, Hardy, & Hager, 2005; Chapman, 2005; Pelletier, 2001).

Respondents provided data about their VR experience including the referral process to VR and the initial reason that they desired VR services. I hypothesized that individuals entering the program for vocational training, to gain employment, to start their own business, or for assistance with employment accommodations would have better employment outcomes than individuals that entered the program for non-

employment related reasons such as to purchase a piece of equipment, pay for medical or counseling services, or to determine disability status.

Respondents also provided information about the type of VR services received in the last six months. If they were no longer receiving services after the first six months, respondents answered a follow-up question to find out why this was the case. People who have a short tenure with VR might have different probabilities of employment, particularly if they leave the program dissatisfied with their counselor or VR services in general. Respondents did not provide data about VR services delivery at baseline because they did not necessarily have an Individualized Plan for Employment (IPE) in place when they were recruited into the study.

Health measures. Several health measures were included to assess overall health, incidence and prevalence of secondary health conditions, and behavioral risk and protective factors. Negative relationships between health factors and employment for people with disabilities have been reported in a number of studies, such as for days of limitation (Ipsen, 2006); issues of pain (Gauthier, Sullivan, Adams, Stanish, & Thibault, 2006; Whyte & Carroll, 2002), and for psychological stress, anxiety and depression factors (Crisp, 2005; D'Arcy, 1986; Sherbourne, et al., 1995; Samkange-Zeeb, et al., 2006). Conversely, good health practices such as social supports, positive outlook, diet, and exercise have been shown to correlate with positive employment outcomes (Crisp, 2005; Ipsen, 2006; Lydell, Baigi, Marklund, & Mansson, 2005; Sherbourne, et al., 1995). A variety of established health measures were used to examine these types of relationships in the sample of VR clients.

The Behavioral Risk Factor Surveillance System (BRFSS). BRFSS data collection is sponsored by the Centers for Disease Control (CDC) to provide “uniform, state-specific data on preventative health practices and risk behaviors that are linked to chronic diseases, injuries, and preventable infectious diseases in the adult population (CDC, 2002, p.1). BRFSS data includes a core set of questions about general health and health risk factors and 17 optional modules focusing on specific health issues such as arthritis, diabetes, asthma, or weight control. BRFSS question wording was used to collect data about (1) functional severity of disability; (2) overall health; (3) days of limitation from secondary health conditions, and (4) health risk and protective factors. The advantage of using BRFSS question wording is that our sample of VR clients can be compared with the general population and the subpopulation of people with disabilities on important health and wellness factors.

A single question from the BRFSS core set of questions was used to assess general health. Respondents used a 5-point likert-type scale ranging from “excellent” to “poor” the answer the question, “In general, how would you rate your health?”

Seven questions from the BRFSS Healthy Days and Quality of Life module (HRQOL-14) were used to measure prevalence (measured in days per month) of secondary health issues. The questions ask respondents to estimate for how many days in the past 30 days (1) the respondent’s physical health was not good; (2) the respondents mental health was not good; (3) the respondent’s poor physical or mental health kept him or her from doing usual activities; (4) the respondent’s pain made it hard to do usual activities; (5) the respondent felt sad, blue or depressed; (6) the respondent felt worried, tense, or anxious; and (7) the respondent believed that he or she did not get enough rest or

sleep. This set of seven questions has been used as a scale of symptom limitation in other studies that examine secondary health conditions for people with disabilities (Ipsen, 2006; Kinne, et al., 2004; Raveloort, et al., 2005). When using these items as a scale, total days of limitation are averaged to determine symptom days per month.

Finally, several items from the BRFSS were used to assess health behaviors. These include (1) two questions to determine weight and height – used to develop a body mass index item for analyzing health impacts for overweight/obesity; (2) two questions to assess daily moderate and vigorous physical activity; (3) and one question for smoking.

Secondary Conditions Surveillance Instrument (SCSI). The SCSI was developed to assess the amount of time people are limited because of secondary health conditions (Seekins, Smith, McCleary, Clay, & Walsh, 1991). The original SCSI asked respondents to rate the amount of time they are limited each week by 40 secondary conditions (e.g. urinary tract infections, depression, fatigue, pressure sores) on a scale of 0 to 3. A rating of “0” means the condition has not been a problem during the previous 2 months, “1” means it has been a mild or infrequent problem (activity limited 1-5 hours per week), “2” means it has been a moderate problem (activity limited 6-10 hours per week), and “3” means it has been a significant problem (limiting activity 11 or more hours per week). In this framework, the total score across secondary conditions serves as a global measure of limitation an individual experiences because of secondary conditions. Seekins, et al. (1994) reported internal consistency for the SCSI of .88. Construct validity of the SCSI has been supported by factor analytic studies demonstrating its use with individuals representing diverse impairment types (Ravesloot, et al., 1997).

Several of the reported SCSII secondary conditions had low incidence rates in the population of adults with physical impairment or were not amenable to health promotion interventions (Ravesloot, et al., 2006; Seekins, et al., 1994; Seekins & Ravesloot, 2000). In order to abbreviate the SCSII instrument and reduce participant burden, items with low incidence and severity, or conditions less responsive to health promotion interventions were excluded from national evaluations of the *Living Well with a Disability* program (Ravesloot, et al., 2006). For the purposes of this project, the abbreviated SCSII that includes 29 secondary health conditions was used. The internal consistency of the abbreviated SCSII measure for the *Working Well* sample was .88 as measured by Cronbach's Alpha.

The Health Promoting Lifestyle Profile II (HPLP-II). The HPLP-II measures six dimensions of lifestyle behavior, including health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management (Walker, et al., 1995). Fifty-two (52) items about engagement in specific health behaviors are rated on a four point scale ranging from never to routinely. Items are aggregated into six subscales (representing different dimensions of lifestyle behavior) and a total score. Internal consistency within the subscales range from .79 to .94 and the total score has a Cronbach's alpha of .94 (Walker, et al., 1995). Principal components analysis supports a six factor model, corresponding to the six health behavior domains (Walker, et al., 1995). The HPLP-II is frequently used to evaluate health promotion practice by individuals with disabilities. (Ennis, et al., 2006; Ravesloot, et al. 2003; Stuifbergen, et al., 2003; Zemper, et al., 2003).

Health care utilization. Health care utilization rates have been used to evaluate a variety of health promotion interventions for individuals with disabilities (Hammond, et al, 2006; Ipsen, et al., 2006; Lorig, et al., 1999; Lorig, et al., 2001; Ravesloot, et al, 2005). Respondents provided 6-month retrospective health care utilization data about number of doctor visits (excluding annual exams), hospital inpatient visits, emergency room visits, and outpatient visits at each data collection point. This data was used to construct a 2 year estimate of medical care utilization. In addition, respondents provided 2-month retrospective data at the final data collection period (18-months) as a way to compare VR client data with other subpopulations of adults with disability who have participated in the national evaluation of the *Living Well with a Disability* program.

Missing Values

Data were complete at the 96% or greater level for all survey questions. Case data were analyzed at baseline (n = 264; 112 questions) and at 18-months (n=162, 134 questions). As Table 4 shows, the majority of cases were complete or nearly complete.

Table 4: Data completeness

	<i>Complete</i>	<i>1 missing</i>	<i>2 missing</i>	<i>3 missing</i>	<i>4 missing</i>	<i>>4 missing</i>
Baseline cases (n = 264)	221 cases 83.7%	26 cases 9.8%	7 cases 2.7%	2 or 1% .8%	1 case .4%	7 cases 2.7%
18-month cases (n = 162)	120 cases 74.1%	27 cases 16.5%	11 cases 6.8%	1 case .6%	2 cases 1.2%	1 case .6%

According to guidelines published from the American Association for Public Opinion Research (2000), case data are considered complete if over 80% of the survey questions have useable answers. 98% of baseline cases and 100% of 18-month cases met this threshold.

Despite nearly complete case data, missing data elements presented some analysis problems. This was particularly problematic for aggregated scores, such as the sum of secondary conditions score that adds limitation ratings across 28 secondary conditions; and the total HPLP score which provides a mean score across 52 lifestyle behaviors.

In general, missing data replacement is not warranted for simple statistical procedures. It is justified, however, when utilizing multivariate statistical tests. “For multivariate analyses involving a large number of items, case deletion can be very inefficient, discarding an unacceptably high proportion of participants, even if the per-item rates of missingness are low, few participants may have complete data for all items” (Shafer, 2001, p. 357). This was the case for the *Working Well* data. For instance, when comparing the sum of secondary conditions score between baseline and 18 months, a total of 19 cases had to be thrown out due to missing data elements.

Rather than omit cases with few missing data elements, I opted to replace data from earlier (or later) surveys provided by the same participant. For instance, if respondent A was missing data for the question ‘How often do you get enough sleep’ in the 18 month survey, I replaced data with respondent A’s answer on the 12 month survey. I completed this process for the 52 questions contained on the HPLP and the 28 conditions on the SCSI.

More typical methods for data replacement include mean replacement or regression imputation, which predicts missing values for a variable based on the variable’s statistical relationship to other variables in the data set (Hair, Anderson, Tatham, & Black, 1998). Rather than work with computer generated scores, however, I

felt that it would be more accurate to use past (or future) participant data, particularly for secondary health conditions, which appear to be highly correlated over time.

Data Analyses

I utilized a variety of statistical methods to analyze the *Working Well* data including independent samples t-tests, correlation analysis, repeated measures ANOVA, and logistic regression. These methods are described in greater detail as specific results are reported. All results are based on the subsample of participants who completed baseline and 18-month follow-up data ($n = 162$). Although specific hypotheses may not require such stringent steps, by using the same sample throughout, it is easier to draw inferences between the primary research hypotheses.

Results

The research reported for this paper focuses on three hypotheses.

Hypothesis 1: *The health conditions and behaviors of VR consumers with disability are similar to baseline health conditions and behaviors of Living Well with a Disability participants.*

Hypothesis 2: *VR consumers with disability report similar health limitations and health behaviors over time, in the absence of a health promotion intervention.*

Hypothesis 3: *Consumer employment outcomes are influenced by secondary health conditions and health promoting behaviors, after controlling for socio-demographic variables.*

Together, these hypotheses help assess the utility of developing and testing health promotion models for consumers of VR services. Data analysis strategies, research results, and brief discussions are presented for each hypothesis.

Hypothesis 1

The health conditions and behaviors of VR consumers with disabilities are similar to health conditions and behaviors of Living Well with a Disability participants.

Consumers of independent living services experienced significant health benefits from participating in the *Living Well with a Disability* health promotion workshop (Ipsen, et al., 2006; Ravesloot, et al., 2005). If VR consumers share similar baseline traits in terms of secondary health conditions, days of reported limitation, and health promoting lifestyle behaviors, they might also benefit from participation in health promotion programming.

The *Living Well* sample (n = 188) consisted of individuals who participated in the *Living Well with a Disability* health promotion program and provided pre and post intervention data. The *Working Well* sample (n=162) included individuals who provided baseline and 18-month follow up data. Both groups were, on average, 44 years old and predominately white (82% vs 84%) or African American (11% vs 11%). The *Working Well* group reported higher rates of part-time or full-time employment (40% vs 17%) and more education (72% > high-school education vs 56% > high school education) than the *Living Well* group. Conversely, the *Working Well* group reported lower rates of coverage from Medicaid (27% vs 62%) and Medicare (28% vs 47%) and higher rates of no health insurance coverage (27% vs 3%) than the *Living Well* group.

Mean ratings for secondary conditions, days of reported limitation, and health promoting lifestyle behavior scales are compared at baseline for the *Living Well* and *Working Well* groups. Between group comparisons for health data are evaluated at a two-tailed alpha level of .05. A more stringent alpha level of .01 is suggested for follow-up comparisons given the large number of independent t-tests required to fully explore between group differences.

Between group comparisons are reported for:

- (1) *sum of secondary conditions* - an aggregate score for each participant that adds severity ratings across 29 secondary conditions included in the SCSI measure.
- (2) *count of secondary conditions*— an aggregate score that adds the total number of different secondary conditions that are endorsed by each participant across 29 secondary conditions included in the SCSI.

(3) specific secondary conditions – secondary condition ratings for each of the 29 listed conditions in the SCSI.

(4) *days of reported limitation* – an aggregate score that averages the prevalence (measured in days per month) of seven secondary health issues from the BRFFS HRQOL-14.

(5) specific limitations – limitation days corresponding to each of the seven secondary health issues from the BRFFS HRQOL-14

(6) *HPLP total* – an aggregate score that adds behavior ratings across 52 health promoting lifestyle behaviors.

(7) HPLP subscales – subscales that measure different dimensions of health promoting lifestyle behaviors including health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships, and stress management.

Secondary conditions. Table 5 reports group differences for the *sum of secondary conditions* and *count of secondary conditions* scores. The *Living Well* and *Working Well* groups report similar sum of secondary conditions scores, but the data indicate group differences regarding the breadth of conditions experienced. The *Working Well* sample experienced, on average, 1.65 fewer different secondary conditions than the *Living Well* group.

Table 5: Secondary conditions aggregate scores

<i>Variable</i>	<i>WW</i> μ	<i>LW</i> μ	<i>t-stat</i>	<i>p</i>
<i>sum of secondary conditions</i>	21.56 (n=162)	23.72 (n=145)	1.43	.15
<i>count of secondary conditions</i>	11.21 (n=162)	12.86 (n=145)	2.52	.01

The *Living Well* and *Working Well* participants report similar severity ratings across many secondary conditions, but the groups diverge around conditions that typically affect wheelchair users, such as spine and circulatory issues, pressure sores, bladder and bowel problems, and issues related to mobility. Table 6 reports group comparisons for the average severity ratings for each secondary condition (WW μ , LW μ , t-stat, p). The percent of study participants that endorse a condition (limitation rated as mild, moderate, or severe) is also reported (WW%, LW%) along with the percent difference between the groups (Dif %). Group differences were significant for highlighted conditions at the .01 alpha level.

Table 6: Secondary condition comparisons

<i>Secondary Condition</i>	<i>WW μ</i>	<i>LW μ</i>	<i>t-stat</i>	<i>P</i>	<i>WW %</i>	<i>LW %</i>	<i>Dif %</i>
<i>WW (n=162)</i>							
<i>LW (177 ≤ n ≤ 188)</i>							
Fatigue	1.53	1.67	1.19	.23	77.8	82.6	(4.8)
Physical conditioning problems	1.62	1.66	.32	.75	75.3	77.8	(2.5)
Sleep problems	1.51	1.38	1.04	.30	73.5	67.2	6.3
Joint pain	1.53	1.49	.32	.75	72.8	71.4	1.4
Chronic pain	1.52	1.26	1.91	.06	66.7	58.1	8.6
Depression	1.14	.98	1.39	.17	59.9	57.8	2.1
Arthritis	1.21	1.11	.58	.56	58.6	54.4	4.2
Eating or weight problems	1.19	1.30	.84	.40	56.8	62.6	(5.8)
Anger problems	.83	.82	.10	.92	51.2	54.3	(3.1)
Isolation	.84	.87	.28	.78	48.8	54.1	(5.3)
Problems with mobility	.81	1.33	4.14	.00	45.7	69.2	(23.5)
Sexual dysfunction	.86	.79	.57	.57	44.4	36.4	8.0
Contractures	.89	.93	.33	.74	43.8	50.0	(6.2)
Carpal tunnel	.74	.41	3.19	.00	38.3	22.7	15.6
Spacticity	.53	1.13	5.78	.00	34.6	65.1	(30.5)
Postural hypotension	.49	.46	.34	.73	34.0	27.7	6.3
Bladder problems	.63	.98	3.06	.00	32.7	55.3	(22.6)
Respiratory problems	.47	.65	1.83	.09	27.8	38.0	(10.2)
Cardiovascular problems	.45	.53	.80	.42	26.5	28.0	(1.5)
Bowel problems	.43	1.0	5.55	.00	25.9	55.9	(30.0)
Dysflexia	.31	.48	1.96	.05	21.0	27.7	(6.7)
Circulatory problems	.48	.90	3.63	.00	20.4	47.3	(26.9)

<i>Secondary Condition</i> WW ($n=162$) LW ($177 \leq n \leq 188$)	WW μ	LW μ	<i>t-stat</i>	<i>P</i>	WW %	LW %	<i>Dif %</i>
Urinary tract infection	.26	.63	4.07	.00	16.1	36.2	(20.2)
Diabetes	.35	.28	.76	.45	15.4	11.4	4.0
Anemia	.23	.28	.70	.48	13.0	18.6	(5.6)
Osteoporosis	.22	.33	1.38	.17	13.0	17.5	(4.5)
Scoliosis	.23	.49	2.95	.00	11.1	29.4	(18.3)
Pressure sores	.16	.35	2.5	.01	8.6	20.6	(12.0)
Alcohol/drug abuse	.10	.04	1.77	.08	8.0	3.3	4.7

Days of limitation. Overall, the *Working Well* group experienced more days of limitation, as measured by the BRFFS Healthy Days and Quality of Life module. The higher rates of limitation from pain, anxiety, and sleep problems for the *Working Well* group fit with their top secondary conditions reported on the SCSi. Table 7 reports on days of limitation comparisons.

Table 7: Days of limitation comparisons

<i>Variable</i> WW ($n=162$) LW ($178 \leq n \leq 184$)	WW μ	LW μ	<i>t-stat</i>	<i>p</i>
Average days of reported limitation	10.87	9.15	2.08	.038
Days physical health not good	11.80	9.89	1.71	.090
Days that activities were limited	7.69	7.74	.05	.961
Days mental health	8.26	8.27	.01	.992
Days that pain limited activities	12.80	9.03	3.14	.002
Days feeling sad or depressed	8.59	8.01	.57	.570
Days feeling tense or anxious	11.81	9.42	2.13	.034
Days with not enough rest	15.10	11.11	3.62	.000

Health promoting lifestyle behaviors. The *Working Well* and *Living Well* groups reported similar rates of health promoting lifestyle behaviors. The exception was in the area of physical activity. This fits with group differences reported for secondary conditions. It may be that individuals who use a wheelchair or who experience sensation

loss (such as spinal cord injury) have more limited opportunities to engage in physical activity and rate this subscale lower (Rimmer, et al., 2004).

Table 8: Health promoting lifestyle behavior comparisons

<i>Variable</i> WW (<i>n</i> =162) LW ($166 \leq n \leq 175$)	<i>WW</i> μ	<i>LW</i> μ	<i>t-stat</i>	<i>p</i>
HPLP – total	2.52	2.49	.62	.535
HPLP - health responsibility	2.44	2.45	.15	.880
HPLP - physical activity	2.01	1.71	4.25	.000
HPLP – nutrition	2.43	2.36	1.07	.286
HPLP - spiritual growth	2.93	2.90	.42	.677
HPLP - interpersonal relationships	2.82	2.88	1.10	.272
HPLP - stress management	2.41	2.51	1.69	.092

Hypothesis 1 discussion. Baseline comparisons of the *Working Well* and *Living Well* groups indicate differences related to the incidence and prevalence of certain secondary conditions, days of limitation, and health promoting lifestyle behaviors. While both groups were drawn from the population of people with physical disability, some differences were expected. VR serves individuals with a range of disabilities to assist them obtain employment. CILs typically provide independent living services to people with more severe disabilities. Not surprisingly, the CIL sample reported higher rates of secondary conditions related to more significant physical problems such as spinal cord injury, cerebral palsy, multiple sclerosis and/or conditions related to sensation loss.

Many of the secondary conditions that are amenable to health promotion, however, had similar prevalence ratings across the two groups. The top ten secondary conditions for the *Working Well* group, including fatigue, physical conditioning problems, sleep problems, joint pain, chronic pain, depression, arthritis, eating and weight problems, anger, and isolation, were also problematic for the *Living Well* group.

These types of conditions are responsive to health promotion programming (Coyle, et al., 2000; Haugli, et al., 2003; Lorig, et al., 2005; Ozminkowski, et al., 2000; Pelletier, 2001; Ravesloot, et al., 2005; Watson, et al., 2004) and efforts to manage them could be beneficial to the VR population.

Group differences were also reported for BRFSS symptom days related to pain, anxiety, and sleep issues. In this case, however, the Working Well group reported higher rates of limitation. Employment outcomes are compromised for individuals who experience depression (Barlow, et al., 2001; Goldberg & Steury, 2001; Simon, et al., 2000), pain (Haugli, et al., 2003; Watson, et al., 2004), anxiety (D'Arcy, 1986; Jiang and Hesser, 2006), and sleep problems (Linton & Bryngelsson, 2000). It follows that effective interventions targeting these health issues might assist VR clients to become employed.

I believe that the similarities between the *Living Well* and *Working Well* groups outweigh their differences. Both groups report limitations from secondary conditions shown to be responsive to health promotion programs. In fact, given that VR clients report higher symptom days from pain, anxiety, and sleep problems, participation in health promotion programming may have even greater benefits.

Hypothesis 2

VR consumers with disabilities report similar health limitations and health behaviors over time, in the absence of a health promotion intervention.

Working Well participants did not receive an intervention as part of this study. As such, it is expected that their reported health limitations and behaviors are stable or demonstrate non-systematic changes over time. This is in contrast to *Living Well*

workshop participants who experienced (1) significant reductions in reported limitation from secondary health conditions (2) significant reductions in BRFSS symptom days and (3) significant improvements in health promoting lifestyle behaviors pre to post intervention; and maintained these changes up to the 12 months (Ravesloot, et al., 2005).

Repeated measures ANOVA to evaluate the within subjects factor of time was used to test Hypothesis 2.

Hypothesis 2.1 – The sum of secondary condition scores are not statistically different over time. Table 9 reports mean values and standard deviations for the *sum of secondary conditions scores (SCSI sum)* at baseline, 12 months, and 18 months. Tests of normality are also reported.

Table 9: *SCSI sum* descriptive statistics

	<i>Baseline</i> (<i>n</i> = 162)	<i>12 months</i> (<i>n</i> = 151)	<i>18 months</i> (<i>n</i> = 162)
<i>SCSI sum</i>	21.56	21.51	20.58
Standard deviation	13.21	13.34	13.29
Z_{skewness}	.587/.191 = 3.07*	.309/.197 = 1.56	.449/.191 = 2.35*
Z_{kurtosis}	.143/.379 = .377	-.918/.392 = -2.34*	-.607/.379 = -1.60
Kolmogorov-Smirnov	.060; <i>p</i> = .200	.096*; <i>p</i> = .002	.092*; <i>p</i> = .002

* Assumption of normality violated at the .05 significance level.

In some cases, the *SCSI sum* scores were significantly skewed to the right or had flat distributions, violating assumptions of normality at the .05 significance level. The Kologorov-Smirnov test, used to evaluate the assumption of normality for sample sizes greater the 50, confirmed these violations (Hair, et al., 1998). Based on this information, non-parametric test statistics are also reported to evaluate *SCSI sum* differences across time⁵.

⁵ I explored a square root transformation of the SCSI scores to correct for the violation of normality. This transformation corrected the issue of skewness, but did not address violations related to kurtosis.

Results from the repeated measure ANOVA, which tests the equality of *SCSI sum* means over time, supports the primary hypothesis. Within subjects effect of time was not significant ($n = 151$; $F = 1.924$; $p = .148$) and all pairwise comparisons were insignificant.

Nonparametric statistics confirm these results. The Wilcoxon signed ranks test is used to evaluate paired differences (two-related samples) and the Friedman test is used to evaluate multiple related samples simultaneously. Although the Friedman test is appropriate for evaluating relationships between the three variables, the Wilcoxon signed ranks test provides a more visual representation of the data by showing negative and positive differences between related pairs. Table 10 provides the non-parametric statistics for *SCSI sum* scores.

Table 10: Non-parametric statistics for the *SCSI sum*

<i>Comparison</i>	<i>Frequencies</i>		<i>Score</i>	<i>Significance</i>
Wilcoxon Test Baseline – 12 months	Negative differences	70	$Z = -.059$	$p = .953$
	Positive differences	67		
	Ties	14		
	Total	151		
Wilcoxon Test Baseline – 18 months	Negative differences	83	$Z = -1.131$	$p = .258$
	Positive differences	71		
	Ties	8		
	Total	162		
Wilcoxon Test 12 months – 18 months	Negative differences	81	$Z = -1.884$	$p = .060$
	Positive differences	62		
	Ties	8		
	Total	151		
Friedman Test Baseline 12 months 18 months	$n = 151$		$X^2 = 3.425$	$p = .180$

Hypothesis 2.2 – The average days of limitation scores are not statistically different over time. The *average days of limitation* score is an average of the prevalence (measured in days per month) of seven secondary health issues from the BRFFS HRQOL-14. Scores can range from 0 to 30. Like *SCSI sum*, the *average days of limitation* score violates assumptions of normality. Table 11 reports the mean values, standard deviations, and tests of normality for the *average days of limitation* score at baseline, 6 months, 12 months, and 18 months.

Table 11: *Average days of limitation* descriptive statistics

	<i>Baseline</i> (<i>n</i> = 162)	<i>6 months</i> (<i>n</i> = 152)	<i>12 months</i> (<i>n</i> = 151)	<i>18 months</i> (<i>n</i> = 160)
<i>Avg days of limitation</i>	10.86	10.83	10.47	10.57
Standard deviation	9.72	9.65	9.25	9.39
Z_{skewness}	.529/.191 = 2.77*	.503/.191 = 2.63*	.589/.197 = 2.99*	.558/.192 = 2.91*
Z_{kurtosis}	-.551/.379 = -1.45	-.658/.391 = -1.68	-.593/.392 = -1.51	-.577/.381 = -1.51
Kolmogorov-Smirnov	.091*; <i>p</i> = .002	.101*; <i>p</i> = .001	.102*; <i>p</i> = .001	.102*; <i>p</i> = .000

* Assumption of normality violated at the .05 significance level.

Repeated measures ANOVA and non-parametric tests are both presented. The within subjects effect of time for repeated measures ANOVA was not significant (*n* = 139; *F* = .737; *p* = .522) and all pairwise comparisons were insignificant. As shown in Table 12, non-parametric test statistics support the hypothesis that the average days of limitation do not show systematic trends of change over time.

Table 12: Non-parametric statistics for *average days of limitation*

<i>Comparison</i>	<i>Frequencies</i>		<i>Score</i>	<i>Significance</i>
Wilcoxon Test Baseline – 18 months	Negative differences	79	Z = -.681	p = .496
	Positive differences	76		
	Ties	5		
	Total	160		
Wilcoxon Test Baseline – 6 months	Negative differences	74	Z = -.386	p = .700
	Positive differences	70		
	Ties	8		
	Total	152		
Wilcoxon Test 6 months – 12 months	Negative differences	70	Z = -.699	p = .485
	Positive differences	66		
	Ties	5		
	Total	141		
Wilcoxon Test 12 months – 18 months	Negative differences	70	Z = -.003	p = .998
	Positive differences	73		
	Ties	6		
	Total	149		
Friedman Test Baseline 12 months 18 months	n = 139		$X^2 = 1.884$	p = .597

Hypothesis 2.3 – The total health promoting lifestyle behavior scores are not statistically different over time. The health promoting lifestyle behavior score (*HPLP total*) averages health behavior ratings across 52 items to assess six dimensions of health behaviors (health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships, and stress management). Scores can range from a minimum of 1 (never engage in the behavior) to a maximum of 4 (routinely engage in the behavior). The *HPLP total* score meets assumptions of normality. Table 13 reports the mean values and standard deviations for *HPLP total* at baseline, 12 months, and 18 months.

Table 13: *HPLP total* descriptive statistics

	<i>Baseline</i> (<i>n</i> = 162)	<i>12 months</i> (<i>n</i> = 151)	<i>18 months</i> (<i>n</i> = 162)
<i>HPLP total</i>	2.51	2.45	2.43
Standard deviation	.466	.494	.489

Repeated measures ANOVA show a significant within subjects factor of time ($n = 150$; $F = 1.52$; $p = .012$) for *HPLP total*, indicating that participant lifestyle behaviors decline over time. This is in direct contrast with individuals who participated in the *Living Well* intervention, who experienced significant improvements in health promoting lifestyle behaviors from baseline to 6 months post-intervention ($n = 122$; $F = 7.417$; $p = .000$).

Hypothesis 2 discussion. One possible explanation for favorable intervention outcomes relates to the concept of regression towards the mean. One might assert that individuals entering programs such as VR or the *Living Well* program are in a crisis state and that, over time, improvements in their health status will naturally occur -- with or without an intervention. Results from Hypothesis 2 provide evidence that this was not the case. While respondents experienced some changes in health status over time, these changes were not systematic. For instance, when examining results from the Wilcoxon signed ranks test for change in secondary conditions between baseline and 18 months, 70 people reported higher incidence of secondary conditions and 67 reported lower incidence of secondary conditions. Likewise, comparisons between baseline and 18 months for days of limitation showed that 79 people reported more days of limitation while 76 people reported fewer days of limitation. Although the data show that health is a transient or shifting state, the evidence does not support that, over time, secondary conditions and days of limitation will improve in the absence of an intervention.

Interestingly, there were trends for health promoting lifestyle behaviors. The data, however, provides an even stronger case for health promotion intervention. From baseline to 18 months, *Working Well* respondents reported a decrease in health promoting lifestyle behaviors. This contrasts with *Living Well* participants, who reported significant health behavior improvements after the *Living Well* intervention (Ravesloot, et al., 2005).

Hypothesis 3

Consumer employment outcomes are influenced by secondary health conditions and health promoting behaviors, after controlling for socio-demographic variables

Ipsen (2006) used binary logistic regression to examine the relationships among employment, secondary health conditions, and health promoting behaviors for individuals with physical disability using cross sectional data from the 2002 BRFSS. The estimated model (n = 3,076) indicated that respondents who were younger, more educated, and married had a higher probability of being employed. In addition, probability of employment was influenced by severity of disability (negative relationship), secondary conditions (negative relationship), and exercise in the last month (positive relationship). While the model supports the relationship between health and employment, it is limited by cross sectional data collection methods, which cannot address questions of causality.

Working Well data can be used to evaluate how presenting secondary health conditions and health promoting behaviors factor into the later attainment or maintenance of employment for VR clients. Two binary logistic models were developed to predict employment based on demographic factors, disability severity, economic factors, secondary health conditions, and health promoting behaviors. The complete list of model variables follows.

Dependent variable.

employment – a dummy variable for part time or full time employment at 18 months with not employed, student, and homemaker as the base case.

Independent variables – demographics.

Demographic variables for age, gender, education, and marital status have been significant predictors of employment for people with physical disabilities (Ipsen, 2006; McNeil, 1997).

age: Age has a quadratic relationship with employment for the general population – peaking at an age range of 45-54 (U.S. Census Bureau, 2006a). Age is reported to have a negative relationship with employment for individuals with disabilities (U.S. Census, 2006c; Ipsen, 2006).

female: a dummy variable that accounts for the influence of female gender relative to male gender. Female gender is typically associated with decreased probability of employment, for both individuals with and without disabilities (Ipsen, 2006; Rucker, Rice, Lustig, & Strauser, 2003; U.S. Census Bureau, 2006a; U.S. Census Bureau, 2006b).

< high school: a dummy variable that accounts for the influence of less than a high school education relative to a high school education. Advanced education is predicted to have a positive relationship with employment (U.S. Census Bureau, 2006a). Less than a high school education is expected to have a negative relationship with employment (relative to a completed high school education).

some college: a dummy variable that accounts for the influence of some college education relative to a high school education. Some college is expected to have a positive relationship with employment (relative to a completed high school education).

college graduate: a dummy variable that accounts for the influence of a completed college education relative to a high school education. College graduate is expected to have a positive relationship with employment (relative to a completed high school education).

married: a dummy variable that accounts for the influence of being married relative to not being married. Ipsen (2006) reported a significant positive relationship between marriage and employment for individuals with physical disability. Marital status is not generally predictive of return to work for the general population, but could be a proxy for social supports that facilitate employment for individuals with disability (Tan, et al., 1997).

Independent variables - severity of disability.

Severity of disability is evaluated using three dummy variables from the Quality of Life and Care Giving module of the BRFSS. Severity of disability variables are hypothesized to have a negative relationship with employment (Ipsen, 2006; McNeil, 1997; U.S. Census Bureau, 2006b).

actlim – a dummy variable indicating current limitation due to physical, mental or emotional problems.

equip – a dummy variable indicating the use of specialized equipment (e.g. a wheelchair, special bed, special telephone).

adlhelp – a dummy variable indicating that help is required from other people to perform routine activities (e.g., household chores, shopping).

Independent variables – economic indicators.

Receipts of Social Security benefits such as Social Security Income (SSI) and Social Security Disability Insurance (SSDI) are reported to have a negative relationship with employment and long-term participation in VR (Drew, et al., 2001; Kennedy & Olney, 2006). It is hypothesized that benefit payments in the form of cash checks and insurance are disincentives to employment. Two variables are included to measure this impact.

ssi – a dummy variable indicating receipt of SSI benefits.

ssdi – a dummy variable indicating receipt of SSDI benefits.

Independent variables - secondary conditions and health behaviors.

scsi sum – the sum of secondary conditions score at baseline. Secondary conditions are predicted to have a negative relationship with employment (Ipsen, 2006).

hplp score – the total health promoting lifestyle behavior score at baseline.

Health promoting lifestyle behaviors are predicted to have a positive relationship with employment (Ipsen, 2006).

Regression results. Two regression models are presented. *Model 1 - Lagged* predicts employment at 18 months (T2), based on independent variables at baseline (T1).

Prob (employment_{T2}) = F (age, female, < high school_{T1}, some college_{T1}, college grad_{T1}, married_{T1}, actlim_{T1}, equip_{T1}, adlhelp_{T1}, ssi_{T1}, ssdi_{T1}, scsi sum_{T1}, hplp score_{T1})

Model 2 – Not Lagged predicts employment at 18 months, based on independent variables at 18 months.

Prob (employment_{T2}) = F (age, female, < high school_{T2}, some college_{T2}, college grad_{T2}, married_{T2}, actlim_{T2}, equip_{T2}, adlhelp_{T2}, ssi_{T2}, ssdi_{T2}, scsi sum_{T2}, hplp score_{T2})

The following table provides descriptive statistics for model variables.

Table 14: Descriptive statistics for model variables

Variable	Baseline			18-months		
	%	M	SD	%	M	SD
<i>employment</i>	NA			51.2%		
<i>age*</i>		44.4	10.71		NA	NA
<i>female*</i>	54.3%			NA		
<i>< high school</i>	4.3%			3.7%		
<i>some college</i>	54.3%			50.6%		
<i>college graduate</i> ⁶	17.3%			26.5%		
<i>married</i>	40.1%			42.6%		
<i>activity limitation</i> ⁷	90.7%			79.6%		
<i>uses equipment</i>	32.7%			35.2%		
<i>help with ADLs</i>	12.3%			14.8%		
<i>receipt of ssi</i>	12.3%			16.0%		
<i>receipt of ssdi</i>	28.4%			32.1%		
<i>sum of secondary cond. health behaviors (HPLP)</i>		21.56	13.21		20.58	13.29
		2.52	.466		2.43	.448

* *age* and *female* were assessed at baseline for both models since they do not change in response to VR services.

⁶ There were changes in education level over time. VR clients often receive education as part of their Individualized Education Plan, which would explain the increase in the college graduation category. The difference seems somewhat inflated, however. Perhaps respondents equated graduation from trade or technical school as equivalent to a B.A.

⁷ Measures for disability severity may have changed in response to VR restorative services. VR can provide specialized equipment to overcome barriers to employment. Reported increases in the use of specialized equipment may have contributed to reductions in reported activity limitation.

Model variables changed over time. For instance, more participants received SSI and SSDI benefit payments at 18 months (as compared to baseline). Education level shifted as more respondents reported college graduation at 18 months than at baseline. Measures of disability severity also changed as fewer individuals reported activity limitations at 18 months, but more people reported use of specialized equipment and assistance with activities of daily living.

These changes can be explained by participation in VR services. In order to receive VR services, eligibility must be established. This eligibility process may facilitate SSI and SSDI payments for some individuals who were not previously classified as having a work disability. Once an individual is accepted into VR, VR dollars can be used to pay for education, specialized equipment, or other services that might facilitate employment outcomes. Delivery of these services provides one explanation for the shift in model variables over time.

Table 15 provides tests of model significance. Model Chi-square statistics show that *Model 1 - Lagged* was not significant. When model variables were not lagged, however, the model was both significant and approached benchmarks for good model fit. McFadden’s R-square values greater than .3 are considered excellent fit (Lattin, 2003), and *Model 2 – Not Lagged* is near this threshold (.154).

Table 15: Tests of model significance

<i>Tests of the model</i>	<i>Model 1 - Lagged</i>	<i>Model 2 - Not Lagged</i>
Model Chi-square	19.716; df = 13; p = .103	34.621; df = 13; p = .001
Cox & Snell R-square	.115	.192
Nagelkerke R-square	.153	.257
McFadden’s Psuedo R ²	.088	.154

Tables 16 and 17 provide prediction classification tables. *Model 1-Lagged* correctly classified 63% of cases into employed vs not employed categories. Prediction increased substantially for *Model 2 – Not Lagged*, where 73.5% of respondents were correctly classified. It appears that model variables shift over time and that more temporal measures of explanatory variables better predict employment outcome.

Table 16: Prediction classification table (*Model 1 – Lagged*)

<i>Observed</i>	<i>Predicted – Model 1</i>		<i>% Correct</i>
	<i>Not employed</i>	<i>Employed</i>	
Not employed	51	28	64.6
Employed	32	51	61.4
Total			63.0

Table 17: Prediction classification table (*Model 2 - Not Lagged*)

<i>Observed</i>	<i>Predicted – Model 2</i>		<i>% Correct</i>
	<i>Not employed</i>	<i>Employed</i>	
Not employed	57	22	72.2
Employed	21	62	74.7
Total			73.5

Table 18 and 19 provide binary logistic regression predictions. Explanatory variables are interpreted using both logit coefficients and probabilities, estimated at the mean of the marginal effects⁸. Logits are helpful in understanding the direction of

⁸ The logit coefficients provide information about the direction of the relationship between the explanatory and dependent variables. Logit coefficients are interpreted like regression coefficients but units of the dependent variable represent logged odds. Probabilities represent the marginal change in probability (i.e. of being employed) given marginal changes in the explanatory variable. Marginal effects or probabilities change with different values of the explanatory variable(s). Without a priori knowledge about specific explanatory values (or combination of explanatory values) to explore, the most straightforward interpretation involves evaluation of probabilities at the mean values of the explanatory variables or at the mean of the marginal effects averaged across observations. Although these two methods should converge with large samples, current practice favors evaluation at the mean of the marginal effects – calculated for each observation (Greene, 2001).

This paper follows recommended practice by calculating the marginal effects for each individual as defined by:

$$\frac{\partial P}{\partial X_{ki}} = b_k * P_i * (1 - P_i)$$

Given: $P_i = 1 / 1 + e^{-I}$ and $I = b_1 + b_2X_{2i} + b_3X_{3i} + \dots + b_kX_{ki}$.

relationships between the dependent and independent variables. Probabilities provide a meaningful measure of magnitude by showing how the probability of employment changes with incremental changes in the independent variables.

Table 18: Logistic regression predictions of employment outcome for *Model 1 – Lagged*

<i>Model 1 - Lagged</i>	<i>Logits</i>	<i>Wald</i>	<i>Sig.</i>	<i>Marginal Effect</i>
<i>age</i>	-.023	1.764	.184	-.0051
<i>female</i>	-.044	.014	.906	-.0097
<i>< high school</i>	2.008	2.939	.086	.3668
<i>some college</i>	.400	.894	.344	.0878
<i>college graduate</i>	.468	.700	.403	.1019
<i>married</i>	.617	2.781	.095	.1374
<i>activity limitation</i>	-.329	.241	.624	-.0729
<i>uses equipment</i>	-.411	.968	.325	-.0920
<i>help with ADLs</i>	-.292	.239	.625	-.0647
<i>receipt of ssi</i>	-.247	.212	.645	-.0546
<i>receipt of ssdi</i>	.204	.231	.631	.0446
<i>sum of sec. cond.</i>	-.030	4.536	.033*	-.0066
<i>health behaviors (HPLP)</i>	-.511	1.549	.213	-.1130
<i>constant</i>	2.867			

* significant at the .05 alpha level.

For dummy variables, predicted probabilities are calculated for each group (dummy and base-case), and the difference between these probabilities reflects the change in probability (i.e. on employment) relative to the base-case.

Table 19: Logistic regression predictions of employment outcome for *Model 2 – Not Lagged*

<i>Model 2 – Not Lagged</i>	<i>Logits</i>	<i>Wald</i>	<i>Sig.</i>	<i>Marginal Effect</i>
<i>age</i>	-.013	.486	.486	-.0026
<i>female</i>	-.225	.349	.555	-.0453
<i>< high school</i>	.714	.458	.499	.1392
<i>some college</i>	-.077	.026	.873	-.0155
<i>college graduate</i>	.484	.705	.401	.0965
<i>married</i>	.501	1.742	.187	.1018
<i>activity limitation</i>	-.189	.139	.709	-.0381
<i>uses equipment</i>	.216	.230	.631	.0425
<i>help with ADLs</i>	-1.015	2.786	.095	-.2074
<i>receipt of ssi</i>	-.663	1.593	.207	-.1347
<i>receipt of ssdi</i>	-.867	4.159	.041*	-.1817
<i>sum of sec. cond.</i>	-.040	6.587	.010*	-.0080
<i>health behaviors (HPLP)</i>	-.690	2.803	.094	-.1385
<i>constant</i>	3.520			

* significant at the .05 alpha level.

The only significant explanatory variable in *Model 1 - Lagged* was the sum of secondary conditions score (*scsi sum*). This was surprising given a substantial literature base that supports the role of demographic characteristics (i.e. age, education, gender), disability severity, and receipt of social benefits in predicting employment. Significant variables in *Model 2 – Not Lagged* included *ssdi* and *scsi sum*. Specifically, the model indicated that receipt of SSDI payments lowered the probability of employment by 18.2 percentage points and that each unit increase in the *scsi sum* scale decreased the probability of employment by .8 percentage points.

Hypothesis 3 discussion. Although *Model 2 – Not Lagged* was the superior model and successfully classified 73.4% of respondents, it had surprisingly little to add to the interpretation of explanatory variables. Demographic characteristics were insignificant predictors in both models, as were measures of disability severity.

Neither model supported the hypothesis that health promoting lifestyle behavior has a positive impact on employment outcome. The model logit coefficients for *hplp score* were in the wrong direction (negative sign), and in *Model 2 –Not Lagged* this negative relationship approached significance ($p = .095$). *hplp score* did not have high correlations with any of the other explanatory variables so multicollinearity is not a likely cause. Misspecification may be a problem, but inclusion of alternate variables to measure health promoting behaviors (such as days of moderate or vigorous exercise) also had a negative relationship with employment.

Discussion and Conclusion

This research provides information about the feasibility of offering health promotion services within the Vocational Rehabilitation system. The research first examined baseline comparisons between VR consumers and CIL *Living Well* participants. The *Working Well* and *Living Well* groups diverged around secondary conditions that were medically based, such as carpal tunnel, spasticity, bladder and bowel issues, circulatory problems, urinary tract infection, scoliosis, and pressure sores. The groups experienced similar rates of limitation, however, for conditions that are responsive to health promotion programming (Coyle, et al., 2000; Haugli, et al, 2003; Lorig, et al., 2005; Ozminkowski, et al, 2000; Pelletier, 2001; Ravesloot, et al., 2005; Watson, et al., 2004). These conditions included fatigue, physical conditioning problems, sleep problems, joint pain, chronic pain, depression, arthritis, eating or weight problems, anger problems, and issues related to isolation.

Group comparisons were also conducted for days of limitation from the BRFFS Healthy Days and Quality of Life module. The *Working Well* group reported significantly higher days of limitation from pain, anxiety, and sleep problems. This was surprising since the *Working Well* and *Living Well* groups rated these conditions similarly on the SCS. It is likely that the SCS rating scale (0 to 3) is less sensitive than the BRFFS days of limitation scale (0 to 30), and did not pick up subtle group differences.

Nonetheless, VR consumers appear to experience more limitation from many conditions amenable to health promotion programming. They also appear in need of such an intervention. The research showed that VR consumers with physical disability report similar rates of secondary health conditions and days of limitation over time. This is an

important finding because one could argue that VR consumer health will gradually improve over time, with or without a health promotion intervention. Because many consumers access VR after a significant injury (RSA, 2006), it is possible that they are still in recovery when they enter the system and will report less limitation from secondary conditions over time. The data contradict this explanation. Secondary health conditions do not appear to systematically improve in the absence of intervention.

Results did indicate that health promoting lifestyle behaviors degrade for the population of VR consumers. There was a significant within subjects factor of time for *HPLP total* ($n = 150$; $F = 1.52$; $p = .012$) from baseline to 18 months. This contrasts with outcomes for many health promotion programs, which report lifestyle behavior improvements pre to post intervention (Ennis, et al., 2006; Ravesloot, et al., 2005; Zemper, et al., 2003).

The outcome of declining health behaviors is not entirely surprising when considering the rehabilitation context. Many VR clients with physical disability enter VR once they have regained health and function. They may have reached this state through intensive physical and occupational therapy services to help them overcome significant injury (RSA, 2006) – services that factor into the physical activity domain. They may have intensified their interpersonal relationships and spirituality, as they recovered from injury or had available time to work in these life areas. Over time, however, commitment to these practices may wane. Reentering the workforce and seeking services through VR demands time and may impact commitment to health promotion practice. This reality strengthens the case for health promotion intervention, particularly if rehabilitation gains

in health and function degrade over a longer time horizon and jeopardize employment status.

The final research hypothesis examined how health conditions and health promoting lifestyle behaviors influenced employment outcome, after controlling for demographic characteristics, disability severity, and receipt of social insurance benefits. Two models were presented, one with lagged explanatory variables. The sum of secondary score (*scsi sum*) was a significant explanatory variable in both models. In fact, it was the only significant predictor in *Model 1 – Lagged*, and one of two significant predictors in *Model 2 – Not Lagged*. This speaks to the importance of intervening on secondary health conditions. If individuals can better manage secondary conditions, there is potential to increase probability of employment.

Health promoting lifestyle behavior, however, was not a significant predictor of employment outcome. It is possible that the health promoting lifestyle behavior variable was measuring something in a different way than hypothesized. Perhaps health promoting lifestyle behaviors serve as a proxy for disability severity, whereby people with more significant disability engage in more health promoting behaviors to manage their marginal health. This explanation aligns with the data presented for Hypothesis 2, which showed a significant decline in health promoting behaviors over time as people presumably recovered from physical injury. It does not fit, however, with correlation data. There were only small correlations between health promoting behaviors (*hlpi score*) and disability severity measures (*limitation, equip, adlhelp*) or sum of secondary conditions scores (*scsi sum*).

Another explanation is that some people, who are committed to health promoting lifestyle behaviors, do not wish to become employed. Individuals that are engaged in meaningful relationships, spirituality, exercise and nutrition, may not desire or have time to engage in employment. They may be gaining fulfillment through non-work pursuits and are satisfied with work disability status.

Although the models do not support a positive relationship between health promoting lifestyle behaviors and employment, it is difficult to assess how outcomes might change when individuals become healthier. Exploratory data analyses about the subsample of respondents who were employed at 18 months (n=85) sheds a different light on the role of health promoting behaviors. Days of absence from work in the last month (sick days) were evaluated as a function of *hplp score*. The role of *hplp score* was not significant, but the relationship was negative and in the expected direction (i.e. individuals who practiced more health promoting behaviors, reported fewer sick days). The literature about work-site based health promotion supports this finding and provides a strong case for promoting healthy behaviors, particularly for employees with multiple health risk factors (Pelletier, 1996; Pelletier, 2001; Pelletier, 2005).

Finally, it is possible that the model is biased because of an omitted variable. Exploratory data analysis of *Working Well* data did not reveal any statistical relationships between employment outcome and rural/urban location or employment outcome and stated reason for entering the VR system. Other explanatory variables might include (1) a measure to assess VR counselor-consumer working relationship (Lustig, Strauser, Rice & Rucker, 2002), (2) variables to account for the type and dollar value of VR services provided (Marini, Lee, Chan, Chapin & Romero, 2008), (3) variables to assess economic

conditions such as unemployment rate by participant location (Cook, et al., 2006), or (4) variables to account for the time between injury and referral to VR (Saunders, Leahy, McGlynn, & Estrada-Hernandez, 2006). Introduction of such variables, however, was not feasible given the data collected as part of this study.

Overall, the majority of model variables were insignificant. This included variables to measure gender, educational attainment, marital status, and disability severity. This was surprising given the many studies that have linked employment to these explanatory variables (Crisp, 2005; Ipsen, 2006; Pelletier, 2001; Tan, et al., 1997).

Limitations

Study limitations may have contributed to these non-findings. First, the sample size was smaller than desired to achieve adequate power. This was quite apparent in the logistic regression, where many expected predictors of employment (e.g. age, gender, and education) were not significant (Ipsen, 2006). Recruitment issues and attrition contributed to this problem and were discussed in the methods section.

Self-report data collection posed potential problems related to response bias. Given that there was not an intervention component, however, it is less likely that respondents had any placebo or Hawthorne effect when self-reporting. Some data triangulation with VR case records would reduce response bias concerns.

Finally, VR consumers who self-selected into the *Working Well* study had different demographic characteristics than VR cases from the larger population (RSA, 2006). This is a concern since it limits the generalizability of study findings, even to the population of interest. A much larger data collection effort might help offset this type of selection bias and reduce many of these limitations.

Despite study limitations and unexpected relationships in the data, I believe there is ample evidence to pursue the development of health promotion programming within VR's array of services. Justifications stem from (1) VR population characteristics which demonstrate clear barriers to access; (2) similarities between the VR population and other disability groups who have benefited from participation in health promotion programs; and (3) VR's role in overcoming barriers to employment.

VR Population Characteristics

The Rehabilitation Services Administration Case Services data (2006) indicates that approximately 30% of VR case closures are for consumers with physical disability. Of 174,090 consumers with a primary physical disability, only 18% were employed when they began VR services; and those that were employed "without supports in integrated settings" (14.6%) received an average hourly wage of \$10.21 (median hourly wage of \$8.25) and worked 30 hours per week. Undoubtedly, the majority of VR consumers with physical disability cannot access health promotion programming through employers because they do not work. For the few that do, underemployment appears to be a factor that may limit access to employer sponsored wellness programs.

The wage and unemployment rates reported by VR clients reflect low education levels. VR case records for clients with physical disability indicate that 22.5% have less than a high school education; 41.8% have a high school diploma; 18.4% have some post-secondary education, and 17.4% have a post-secondary degree (Bachelor's degree, Associate degree, Technical Certificate, Master's degree, etc) when they begin VR services (RSA, 2006).

RSA-911 case records also reveal that 43% of clients with physical disability have no health insurance benefits when they enter the VR program. It is probable that lack of insurance coverage contributes to the 32% of VR clients with physical disabilities that receive some form of medical service through their Individualized Plan for Employment (IPE) – services that can include corrective surgery, therapeutic treatment, dentistry, nursing services, drugs and supplies, assistive devices, vision services, podiatry, physical therapy, occupational therapy, speech therapy, mental health services, services to address complications from chronic medical conditions, and other medical related rehab services (RSA, 2006). Lack of insurance or no insurance is cited as a barrier to accessing timely health care (Hanson, et al., 2003; Tu, 2004). Presumably, VR consumers with limited financial resources delay attention to health issues until they can be addressed with VR dollars.

Overall, VR consumers with physical disability appear to experience worse economic conditions than the general population or sub-population of people with disabilities. I believe that these employment, education, and health insurance barriers provide a basis for exploring health promotion programming within VR's array of services. It is also possible that costs incurred to offer such programming would be offset by reduced VR expenses in other arenas, such as services to address complications from chronic medical conditions.

The *Working Well* sample (n=162) is a subset of VR clients reporting physical disability. Although the study sample reported higher rates of employment, education, and health benefits than VR case records reflect, they provided in-depth information about health conditions and behaviors that substantiate the need for health promotion

services. *Working Well* participants reported that they were limited from fatigue (78%), physical conditioning problems (75%), sleep problems (74%), joint pain (73%), depression (60%), eating or weight problems (57%), anger problems (51%) and feelings of isolation (49%). Many of these factors have been linked to poor employment outcomes.

For instance, several studies highlight a negative relationships between employment and: depression (Crisp, 2005; Samkange-Zeeb, et al., 2006; Sherbourne, et al., 1995); anxiety (Jiang & Hesser, 2006); sleep problems (Crisp, 2005; Linton & Bryngelsson, 2000; Sherbourne, et al., 1995); pain level (Crisp, 2005; Gauthier, et al., 2006; Haugli, et al., 2003; Whyte & Carroll, 2002); feelings of isolation or lack of social supports (Crisp, 2005); and fatigue (Leonne, et al. 2006). Other factors of relevance to health promotion include negative associations between employment and poor self-perceptions of health and negative affect (Roessler, et al., 2001).

Health Promotion Outcomes

Although mental and physical health conditions impede employment, many of these conditions are amenable to health and wellness programs and can be effectively managed. Groups that have benefitted from such programs include consumers of CIL services with physical disabilities (Ravesloot, et al., 2005); people with chronic diseases (Lorig, et al., 1996; Lorig, et al., 2001), arthritis (Lorig, et al., 2001), multiple sclerosis (Stuifbergen, et al., 2003); fibromyalgia (Ennis, et al., 2006) and spinal cord injury (Zemper, et al., 2003); and employed people with multiple health risk factors (Ozminkowski, et al., 2000; Pelletier, 2005).

The VR population with physical disabilities share qualities with disability groups highlighted in the health promotion literature. For instance, of the 174,090 VR cases of individuals with a primary physical disability, 31.4% had an accident or injury that resulted in spinal cord injury/traumatic brain injury and 3.3% reported spinal cord injury unrelated to an accident. Others reported arthritis (6.2%), multiple sclerosis (1.7%); chronic physical conditions (14.3%), heart and circulatory problems (4.9%), respiratory problems (1.1%), and diabetes (4.1%) as their primary physical disability (RSA, 2006).

Data comparisons between the *Working Well* and *Living Well* samples confirm similarities in terms of secondary conditions. The top ten secondary conditions reported for the *Working Well* group were also reported at similar baseline rates for individuals benefitting from the *Living Well with a Disability* health promotion program.

One of the primary outcomes of health and wellness programs is self-efficacy to engage in health promoting behaviors (Ennis, et al., 2006; Lorig, et al, 2001; Lorig, et al., 2005; Lorig, et al, 2006; Zemper, et al., 2003). “Numerous studies have demonstrated that perceived efficacy influences every aspect of personal change – whether individuals consider changing behaviors, how hard they will try to change behaviors, how much they change, and how well they are able to maintain behavioral change (Stuifbergen, 2006, p 33S). Self-efficacy to engage in health promotion increases the probability of doing so, and is likely to facilitate movement towards employment.

VR Service Delivery

The state and federal system of VR programs function within Rehabilitation Act guidelines. Section 103(2) of the Act broadly defines allowable VR services as any activity necessary to assist an individual prepare for, secure, retain, or regain

employment. Clearly, health promotion fits within this rubric if it is effective in improving employment outcomes. Circumstantial evidence presented in this paper and the literature makes a compelling argument that this might be the case.

VR is positioned to make a substantial impact in access to health promotion for people with disability. VR agencies serve approximately 600,000 clients each year and are located throughout the United States. They offer a systemic delivery access point for people who are not employed or who lack viable alternatives for obtaining or paying for health promotion services. Health and wellness programs that have been developed for peer facilitation (e.g. Living Well with a Disability or the Chronic Disease Self-Management Program) allow for service delivery to take place anywhere by any one. Using local community members, VR contracted services could pay for service delivery without impacting existing staff responsibilities.

Access through VR services may be particularly important to rural people, since they are distanced from primary and specialty care doctors (Chan, et al., 2006). In rural communities, primary prevention takes on a significant role in maintaining health. Peer facilitated health promotion services may be one strategy to better serve rural remote consumers.

Conclusion

This research sets the stage for further exploration about offering health promotion within VR services. Undoubtedly, VR consumer characteristics present a need for access; and effective health promotion programs offer a method. Before VR service delivery becomes the vehicle, however, additional research needs to be conducted. Specifically, future studies must address the effectiveness of health

promotion services for VR clients, focusing on outcomes of relevance to VR and the Rehabilitation Act. While some of this research is underway, inadequate grant funding limits the size and scope of health promotion research for people with disabilities (DeJong, et al, 2002; Haber, 2002; Rimmer & Braddock, 2002). Until a large-scale effectiveness study is supported, it will be difficult to adequately assess the impacts of health promotion for VR consumers and defend health promotion's role within VRs array of services.

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Appendix A: Participant Recruitment Packet



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Appendix B: 11 Point Summary and Human Subjects Protection Course Certifications



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