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Physical Activity in a Cohort of Medicaid Beneficiaries with Physical Impairments: Recruitment and Outcomes

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FINAL REPORT
Submitted to the Centers
for Disease Control and Prevention

**PHYSICAL ACTIVITY IN A
COHORT OF MEDICAID
BENEFICIARIES WITH
PHYSICAL IMPAIRMENTS:**

RECRUITMENT AND OUTCOMES

THE UNIVERSITY OF MONTANA RURAL INSTITUTE

**September 2004
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Final Report
Centers for Disease Control and Prevention

**Physical Activity in a Cohort of Medicaid Beneficiaries with
Physical Impairments: Recruitment and Outcomes**

Rural Institute on Disabilities
University of Montana

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Executive Summary

This document reports on research conducted by the University of Montana for the Office of Disability and Health at the Centers for Disease Control and Prevention. The research project, conducted between September 30, 2000 and September 29, 2004 was accomplished in three separate but related studies. The research was conducted at the New Directions program, a community-based health promotion and wellness clinic operated through the rural Institute on Disabilities at the University of Montana. We collaborated with the State Department of Medicaid to recruit Medicaid beneficiaries with mobility impairments in Missoula County to participate in the research. We recruited 368 of a possible 1535 people who were listed in administrative records as having a disability. We used surveys collected from this cohort to further assess eligibility criteria and selected 224 individuals to participate in the research projects. Additionally, we included individuals who were not Medicaid beneficiaries in studies two and three, but were using our fitness facility and consented to complete measures for the study.

In the first study, individuals were randomly assigned to one of two different treatment conditions. Individuals assigned to the treatment condition were telephoned by a graduate research assistant who used a Motivational Interviewing (Miller & Rollnick, 2002) protocol to recruit individuals into an exercise planning interview conducted at our fitness center. Individuals in the control condition received a series of three newsletters that focused on the potential improvement of high base-rate secondary conditions (e.g. pain, fatigue and depression) from participating in an exercise program. Results indicated that the Motivational Interviewing condition was three times more effective than the newsletter condition for recruiting participants after taking into account demographics, perceived barriers, and Transtheoretical Model stage of change (Prochaska &

DiClemente, 1982).

In the second study, we examined the validity of using a touchscreen computer assisted healthcare resource utilization system (CAHRUS) in the context of our fitness center for collecting healthcare utilization information. The advantage to this set up was our ability use a seven day recall to increase accuracy of responding. We collected two additional data sources to verify the responses to our computer system: office visit progress notes and administrative claims data from the State Department of Medicaid. Overall, results suggested the self-report computer system provided a good measure of healthcare utilization.

In the third study, we used the computer system (CAHRUS) to track exercise visits and intensity as well as healthcare utilization for a sample of 179 participants. Results showed a very strong negative, cubic relationship between exercise performed during each of 45 fifteen-day periods at time one and healthcare utilization three months later. Between 56 and 77 percent of the variance in health care utilization three months later was attributable to exercise performed. Overall, the regression equations indicated substantial health care utilization reductions following moderate increases in physical exercise.

Combined, these studies provide direction for conducting cost-effective recruitment into physical activity programs developed for people with mobility impairments. Further, we present an efficient and attractive measurement system for collecting healthcare utilization data and tracking exercise participation. Finally, these studies present a compelling argument for directing resources to increase physical activity of people with mobility impairments, particularly those who are Medicaid beneficiaries.

CHAPTERS 1-4

Chapter 1

Background and Introduction

Background and Introduction

“Underemphasis of health promotion and disease prevention activities targeting people with disabilities has increased the occurrence of secondary conditions (medical, social, emotional, family, or community problems that a person with a primary disabling condition likely experiences).”

Healthy People 2010, Chapter 6, p. 1

It has been 18 years since the concept of secondary conditions was introduced onto the national disability agenda (Marge, 1988; National Council on Disability, 1986) and 16 years since a modest research and development program was initiated to begin addressing the issue systematically (Houk & Thacker, 1989). Since then, there has been an explosion of interest in the area (U.S. Department of Health and Human Services, 1999; White & Seekins, 1999; World Health Organization, 2001) and the resources allocated to research have grown substantially (e.g., National Institute of Disability and Rehabilitation Research Long-Range Plan, 1999; National Institutes of Health, 1993).

The development of this field of inquiry began with a great deal of optimism about the ease with which progress could be made. Indeed, several research, service, and advocacy efforts have been quite successful. For example, Rimmer, Braunschweig et al. (2000) reported that a physical activity program for stroke survivors resulted in substantial physical and psychological benefits. Tate (2000) reported that health benefits were observed in a cohort of women with post-poliomyelitis following a four session health promotion and wellness intervention. Stuijbergen (1995) reported on the health behaviors and quality of life outcomes of women with Multiple Sclerosis. Our own research has developed measures and methods for assessing secondary conditions among adults with disabilities related to mobility impairments (Seekins, Smith, et al., 1990;

Raveslout, Seekins, et al.,1997; Raveslout, Seekins, et al.,1998). In addition, we have developed and evaluated a program, Living Well with a Disability, that has shown promise as a cost-effective intervention for preventing and managing secondary conditions experienced by adults with mobility impairments (Raveslout, Seekins, et al., 1998; Seekins, White, et al., 1999a; Seekins, White, et al., 1999b). Importantly, advocates succeeded in securing a separate chapter on the health of the 54 million people with disabilities as part of Healthy People 2010; with 13 objectives and several hundred linked objectives in other chapters (U.S.Department of Health and Human Services, 1999).

The completion of early research projects provided the foundation to begin a critical examination of the issues involved in promoting health and preventing and managing secondary conditions experienced by people with disabilities. At the same time, the standards for conducting research in health promotion and assessing the success of research methods and outcomes have increased. Chief among the issues that have emerged is the expectation of measuring the cost-effectiveness of intervention programs (Gold, Siegel, Russell& Weinstein, 1996).

Modeling the healthcare cost-effectiveness of health promotion interventions for reducing secondary conditions on medical healthcare cost-effectiveness (see Gold, Siegel, Russell& Weinstein, 1996) seems straightforward at first glance. In practice, however, it poses significant methodological challenges. First and foremost, health promotion interventions do not have direct effects on health outcomes. Instead, health promotion interventions affect behaviors that are believed to have positive physiological effects that

in turn, translate into improved health outcomes (e.g. aerobic exercise increases cardiac artery elasticity which reduces the likelihood of myocardial infarction). This two-stage intervention process suggests two layers of cost-effectiveness research. First, the cost-effectiveness of programs for attaining stable behavior change and second, assuming consistent health behavior, the healthcare cost-effectiveness of health behavior adoption by some cohort.

One of the challenges to developing cost-effective behavior change programs is recruiting people into these programs. Without cost-efficient methods for recruiting subjects and maintaining their involvement in behavior change interventions, there can be no healthcare cost-effectiveness. The overall goal of this project was to examine methods for recruiting adults with mobility impairments into a physical activity program and to measure program outcomes, including healthcare costs, using a unique, valid measurement strategy.

The Cost of Secondary Conditions

Resource limitations are the implicit or explicit constraint underlying health-care decisions... From the societal perspective, all resource costs and savings are at issue... The principal guiding the valuation of resources is opportunity cost, reflecting competing societal demands for resources (p. 208).

Luce, Manning, Siegel & Lipscomb (1986)
Cost-Effectiveness in Health and Medicine

The costs of disability are significant (Trupin, Rice, et al. 1995). Increasingly, secondary conditions are being recognized as a major contributor to those costs. From the societal perspective, the costs of preventing and treating secondary conditions include

both personal and social costs (Russell, Siegel, Daniels, Gold, Luce and Mandelblatt, 1996).

Personal costs. From the personal perspective of people with disabilities, the cost of illness, injury and the associated secondary conditions includes not only lost productivity due to functional limitation, but the opportunity cost of time spent in health care treatment and health promotion. The actual value of these costs is presently unknown (Luce, Manning, Siegel & Lipscomb ,1996). Aside from the economics of secondary condition prevention and treatment, secondary conditions are associated with decrements in quality of life in domains such as family, community involvement and recreation. These changes in quality of life are currently being seen as participation limitations (World Health Organization, 2001).

This focus on participation has been articulated in both the International Classification of Function (ICF; World Health Organization, 2001) and Healthy People 2010 objectives related to disability and secondary conditions (Healthy People 2010, chapter 6). The ICF model of disablement specifically identifies participation in life's activities as the critical outcome and implies that public health efforts to prevent secondary conditions should result in broader participation of all adults with disabilities. Similarly, HP 2010 highlights the disparities between people with disabilities and general population in their levels of participation as well as in their general life satisfaction.

Social costs. From the social perspective, secondary conditions are costly because of both lost productivity and the costs associated with treating secondary

conditions by medical interventions. As an example, the medical costs associated with spinal cord injury, not including the first year post injury, are estimated at \$24,000 annually (Phillips, Kirarli, et al., 1998). Overall, it is estimated that 32% of medical costs are incurred by 14% of the population (Trupin, Rice, et al., 1995). While the exact relationship between cost of care and the incidence of secondary conditions in people with disabilities is not known, it stands to reason that secondary conditions play a substantial role in the cost of care.

Cost-Effectiveness of Health Promotion

During the past decade, secondary conditions have been recognized as a significant health threat (Lollar, 1994; McDonald, Stephens, et al. 1996; National Institutes of Health, 1999; Patrick, Richardson, et al., 1994; Pope 1992; Pope & Tarlov, 1991; Ravesloot, Seekins, et al., 1997; Rimmer, 1999b; Seekins, Clay et al., 1994; Seekins, White, et al., 1999a; Turk, Geremski, et al., 1997; Vines, Shackelford, et al., 1996; White, Gutierrez, et al., 1996; White & Seekins, 1996, 1999). This field of research has highlighted how medical, psychological, social and environmental consequences of having an impairment (i.e. secondary conditions) magnify the impact of the impairment on an individual's ability to participate in daily life.

As the importance of secondary conditions became apparent, researchers began to develop interventions for reducing secondary conditions. One very promising approach to the prevention and management of secondary conditions is the application of health promotion principles to the population of adults with disabilities (Cole, 1994; Marge, 1988 ; Ravesloot, Seekins, et al., 1998; Seekins, Clay & Ravesloot, 1994). This approach

uses community-based public health education methods to help people with disabilities reduce the incidence and severity of secondary conditions that they experience. A variety of health promotion approaches have been described in the literature (Lorig, 1996; Raveslout, Seekins, et al, 1998; Rimmer, Braunschweig et al., 2000)). These interventions show promising results for increasing participation of adults with disabilities in community life by reducing secondary conditions. However, the cost-effectiveness of implementing interventions to reduce secondary conditions has been addressed only in preliminary terms.

The development of intervention models is only the first step in the widespread application of interventions. In addition to demonstrating efficacy, intervention programs must show that they can be widely applied in the real world. That is, proponents must show that people will use and benefit from the programs when they are made available to the general public. This has been a problem for many health promotion interventions. For example, smoking cessation has a much longer health promotion history than the disability and health field. Smoking cessation researchers have shown that smoking cessation programs are effective for people when they attend the programs regularly but they have also found a discrepancy between expressed interest in and use of such programs. A large HMO on the West Coast surveyed its members who smoke to find out who would come to a smoking cessation program (Prochaska & Marcus, 1994). Of those who responded, over 70% indicated they would attend. When the program was made available and widely marketed to the HMO members for the period of one-year, only 4% were recruited to participate. Hence, it should not be surprising to disability and health

researchers that recruitment into health promotion programs for reducing secondary conditions presents a similar problem.

The Trans-Theoretical Model of Behavior Change

“If we try to help sedentary populations with action oriented interventions, we risk serving them badly. We must survey what stage of change populations are in so we can match their needs rather than expect them to match our action oriented interventions.”

Prochaska and Marcus (1994) p. 166

The Transtheoretical model of behavior change (Prochaska,& DiClemente, 1982) provides a promising framework for developing cost-effective health promotion program implementation strategies. This model suggests a process people go through on their way to making lifestyle and behavior changes. It identifies five stages (i.e., pre-contemplation, contemplation, preparation, action and maintenance) with associated intervention strategies for each stage. Individuals in the pre-contemplation stage deny any need for change and have no intention of making a behavior change. Those in contemplation recognize the benefit of making changes, but have no immediate plans for doing so. When people move into preparation, they are making immediate plans for behavior change and are making the necessary arrangements for such change. When people reach the action stage, they are engaged in regular behavior change activities and they often move straight into the maintenance stage. In maintenance, individuals are working to avoid situations that are high risk for adopting the previous behavior pattern and are building incentives for the behavior changes. In the termination stage, the individual no longer identifies risky scenarios for behavioral recidivism and is unlikely to return to

previous behavior patterns.

This model of behavior change has been applied widely to specific health behaviors like smoking cessation. More recently, it has been applied to physical activity with similar results. For example, in a sample of 610 community volunteers, Marcus and Simkin (1993) found that, 39 percent were in contemplation, 37 percent were in preparation, and 24 percent were in action for physical activity behavior. By using a stage matched intervention consisting of self-help materials, researchers were able to move the sample significantly through the stages so that at the end of the study 17% were in contemplation, 24% were in preparation, and 59% were in action. While studies such as this suggest the utility of applying the trans-theoretical model of change to physical activity, we are unaware of any specific applications to people with mobility impairments and physical activity behavior changes.

Stages of change and people with disabilities. As research on disability and health continues, it is imperative that we develop health and wellness interventions that are useful for this specific population. Unfortunately, researchers have reported significant problems in their attempts to recruit potential consumers into health promotion programs. These researchers are struggling to understand why many people with disabilities often express interest in such programs but few participate when the opportunity is presented (Roller, 2000).

Using the Transtheoretical model of behavior change, we may understand the recruitment difficulties faced in disability health promotion in a different light. Looking back on our work in health promotion for people with disabilities, we have focused our

intervention primarily on the preparation action, and maintenance phases of behavior change. In fact, the Living Well with a Disability program addresses these areas specifically. While this work has been useful for the individuals who participate in the program, like other researchers in the field, we have documented similar difficulties with recruitment. According to Prochaska and Marcus (1994), our difficulty in recruitment is likely due to our action-oriented intervention that is not appropriate to individuals in pre-contemplation and contemplation.

To highlight the utility of the stages of change for exercise in people with disabilities, consider that Healthy People 2010 reports only 23% of individuals with mobility impairments regularly engage in physical activity for 20 minutes three times per week. By definition, these individuals would fall into the action, maintenance or termination stage of change. The remaining 77 percent would fall in either the precontemplation or contemplation stage. For these individuals, Prochaska and Marcus (1994) recommend moving from reactive to proactive recruitment methods. Study one compared these two approaches for recruiting individuals with mobility impairments into an exercise program.

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Chapter 2

Study One

Readiness and Barriers to Exercise Behavior Change of Medicaid Beneficiaries with Physical Impairments

Abstract

People with disabling physical impairments are even more sedentary than the general population, which puts them at risk for additional limitation due to secondary conditions like obesity. Very little research has examined multi-level models that include personal factors like readiness for change and environmental factors like barriers to physical activity. The aim of this study was to investigate the effect of readiness for change and barriers to physical activity on rates of attending an exercise planning session. The study sample of 224 people was drawn from the population of 1535 non-institutionalized Medicaid beneficiaries designated as having a disability living in Missoula County, Montana, USA. The study used a completely randomized experimental design assigning individuals either to the treatment condition, Motivational Interviewing (Miller & Rollnick, 2002) or a control condition of three information newsletters delivered by mail. Assignment to Motivational Interviewing led to greater participation in the planning interview (OR 3.04). Individuals in the contemplation stage were more likely to participate in the planning interview than those in the pre-contemplation stage (OR 4.52). Participants ratings of exercise barriers predicted planning interview attendance (OR .57). There was no evidence of treatment effect moderation by education, stage of change or barriers.

Readiness and Barriers to Exercise Behavior Change of Medicaid Beneficiaries with Physical Impairments

As with the general population, physical activity studies of adults with physical impairments due to chronic disease or permanent injury consistently demonstrate the utility of physical activity for promoting general health in this population (Minor *et al.*, 1989; Ettinger *et al.*, 1997; Rimmer *et al.*, 2002). Importantly, physical activity for this population represents a health disparity evident in the proportion of adults with impairments who engage in moderate physical activity (ie 20 minutes of physical activity three times per week). Only 23% of this population meet this criteria compared with 33% of the general population (US Department of Health and Human Services, 2000).

Sedentary adults **without** impairment are at increased risk for developing disabling conditions from chronic disease and injury. Likewise sedentary adults **with** impairment are at increased risk of becoming further disabled by secondary conditions (eg obesity) and chronic disease (Coyle *et al.*, 2000; McDonald, 2002; Ravesloot *et al.*, 1997; Rimmer *et al.*, 2002; Seekins *et al.*, 1994).

Consistent with recommendations from the Cooper Clinic Conference on Innovative Approaches to Understanding and Influencing Physical Activity (Buchner and Miles, 2002), recent physical activity and disability research has begun to investigate both person and environmental variables as correlates of physical activity (Kinne *et al.*, 1999; Stuijbergen and Becker, 1994). However, contrary to conventional wisdom, these cross-sectional studies have not detected an association between environmental barriers and

physical activity status.

The social model of disability adopted by the World Health Organization (WHO, 2001) includes environmental factors for understanding people's ability to participate in their normal social roles given functional limitations due to an impairment. From this perspective, we would expect a disabled individual's ability to participate in physical activity to be in part, the outcome of the interaction between readiness to adopt behavior change and environmental factors that may either support or erode their ability to change behavior.

From the perspective of the Trans Theoretical Model (Prochaska and DiClemente, 1982), the goal of health behavior interventions should be to move people through the stages of change toward maintenance. One method for achieving this movement is Motivational Interviewing (Willer and Rollnick, 2002). There are no published studies of either the TTM or Motivational Interviewing that focus on physical activity for adults with physical impairments. The goal of this study was to explore movement into the preparation stage of change, which was represented by having individuals attend a physical activity planning interview.

Recruitment of people with physical impairments into physical activity studies has been a substantial problem for intervention researchers attempting to conduct effectiveness studies (Kinne *et al.*, 1999; Rimmer *et al.*, 2002). Consequently, we conducted this study as an effectiveness study that would allow specific, useful recommendations on removing barriers and promoting movement in the early stages of

change for a heterogeneous population of people with impairments (Glasgow *et al.*, 2003).

In order to examine the relative role of readiness for change and environmental barriers on physical activity, we conducted an experimental study of Motivational Interviewing for recruiting Medicaid beneficiaries with physical impairments into a physical activity program. The aim of this study was to investigate the effect of readiness for change and barriers to physical activity on rates of attending a planning session to begin a physical activity program at our fitness facility.

Methods

We recruited the study sample from the population of all Medicaid beneficiaries residing in Missoula County, Montana who were between 18 and 65 years old and had a disability according to administrative records (N=1535). We mailed a letter inviting individuals to return a post-card to receive a brief survey they could complete to earn a ten dollar stipend. We received completed surveys from 368 individuals that were used to further assess study selection criteria. To be included in the experimental portion of the study, survey respondents needed to indicate at least one physical impairment and be willing to have additional contact with the research team via either telephone or mailed information. Further, individuals indicating either mental retardation or traumatic brain injury were not included. Of those returning surveys, 61.9% met eligibility criteria (n=224). Table 2.1 includes demographics and the proportion of each impairment by treatment group. The total percentage of impairments is greater than 100 because many

respondents indicated they had more than one impairment. Most individuals not meeting eligibility criteria reported only a mental disorder. Individuals reporting co-morbid

Table 2.1 Demographics and Impairments by treatment group

	Treatment (n=105)	Control (n=119)
Mean Age	54.8	51.6 ^a
Education	12.7	12.6
Gender (% women)	65.4	65.5
Race (% non white)	10.6	9.2
Employment (% employed)	15.4	12.0
Amputation %	1.9	5.0
Arthritis %	33.7	43.9
Back or Neck Problem %	41.3	38.7
Cancer %	3.8	4.2
Cerebral Palsy %	2.9	3.4
Diabetes %	17.3	13.4
Eye/ vision problems %	20.2	29.4
Fractures, bone/joint injury %	17.3	23.5
Hearing problems %	6.7	5.9
Heart Problem %	8.7	10.9
Hypertension %	13.5	19.3
Lung/breathing problems %	20.2	30.3
Mental disorder %	32.7	36.1
Multiple Sclerosis %	2.9	2.5
Muscular Dystrophy %	1.0	2.5
Post Polio %	1.0	.8
Spinal Cord Injury %	4.8	5.9
Stroke Problem %	5.8	7.6
Walking problem	41.3	44.9

^aNote: indicates statistical difference at .05

mental and physical impairments were included due to the very high rates of co-morbidity in this population.

Measures The survey used to establish study eligibility criteria also included the paper and pencil measures for the study. Impairment status was collected following the categories of the National Health Interview Survey (Centers for Disease Control and Prevention, 2000). We measured stage of change for physical activity using the Stages of Exercise Behavior (SEB) questionnaire (Marcus and Simkin, 1993). This five item true - false inventory allows classification of respondents into one of the five stages of change (ie pre-contemplation, contemplation, preparation, action, maintenance) based on either their history of exercise (ie greater than six months regular exercise = maintenance) or their intent to exercise (ie not currently exercising, but intend to begin exercise within the next six months = contemplation). Test re-test reliability of this measure using the Kappa index has been reported as .78 for a two-week period (Marcus *et al.*, 1992). The stability of the scale is unknown for people with physical impairments. We included individuals in this study representing all five stages of change because the target behavior was participation in exercise at our fitness facility. Given the income restrictions for Medicaid eligibility, we anticipated that few if any participants would be exercising at a fitness center at baseline.

We measured barriers using the Disability and Health Perceived Barriers (DHPB) questionnaire (Murphy-Southwick and Seekins, 2000). We based our questionnaire on the Barriers to Health Activities scale (Becker *et al.*, 1991). We added 11 items to this scale for a total of 27 potential barriers for engaging in health promotion. Individuals rate

the degree of difficulty they would have with each barrier using a scale from zero (not a problem) to three (a big problem). For this study, we used principal components and reliability analyses to identify five, additive unidimensional factors that used 19 of the original 27 items. The five factors along with the items, internal consistency (coefficient alpha) and stability over eight months are listed in Table 2.2. We used the numerical average of each set of items for the dimension score to keep the original scale for each dimension. A copy of study measures is included in Appendix A.

Study Design and Procedures All study procedures were reviewed and approved by the University Institutional Review board. Individuals were randomly assigned into either the Motivational Interviewing treatment group or a control group. Motivational Interviewing (MI) was developed to facilitate behavior change in substance abuse treatment. It is a “client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence” (Miller & Rollnick, 2002). Motivational Interviewing has been used successfully to help people change their level of physical activity (Harland et al., 1999). Individuals in the treatment group were mailed a post-card indicating a date and time when we would contact them by telephone as part of the study. A graduate research assistant in her third year of clinical training in psychology was trained by a Motivational Interviewing Network of Trainers (MINT) trainer. We produced a telephone contact protocol based on the MI techniques that was reviewed by the MINT trainer and used by the graduate research assistant during the MI calls (Appendix B). The control group was mailed a series of three newsletters over a six-month period. These newsletters each focused on the relationship between a specific

Table 2.2 Internal consistency and eight-month stability of the five barrier dimensions.

Barrier Dimension	Coefficient alpha	8-month stability
Pain	.78	.69
My disability is limiting me too much these days.		
I have a hard time thinking and concentrating.		
I get tired easily.		
I have pain when I do too much.		
My daily self-care needs take too much energy.		
Lack of Social Support	.80	.67
My doctor will not approve of my coming.		
Other important people tell me not to come.		
Immediate environment	.75	.72
It's difficult to get in and out of my house.		
My neighborhood has too few curb cuts.		
It is dangerous for me to leave my house.		
Buildings are not accessible to me.		
I don't have the assistive equipment I need.		
I need someone to help me.		
Macro environment	.64	.61
It would take too long to get to the program.		
Chemicals in the environment bother me.		
The weather is often too bad to get out.		
I don't have accessible transportation.		
Care provider responsibilities	.57	.66
I have to arrange day care for my children.		
I take care of another family member.		

symptom (eg pain, fatigue, depression) and physical activity. Additionally, the newsletters invited people to develop a physical activity program at our fitness center by calling to schedule a physical activity planning interview. Readability analysis using the Flesch-Kincaid method indicated the newsletters were written at an eighth grade reading level. The purpose of both experimental conditions was to get individuals to attend a one-to-one exercise planning interview conducted at our fitness center.

Data Analysis Subject confidentiality was maintained by assigning each participant a unique ID number which was used throughout the study. All data were entered and checked for errors. Analyses were conducted on an intention to treat basis. We computed logistic regression with four blocks of independent variables entered hierarchically (ie demographics, barriers to exercise, stage of exercise change, treatment group assignment). We blocked independent variables in order to report results for effects at each step of the model building procedure. We arranged the order of variable entry into the logistic equation to represent our assumptions about the causal flow of demographic, barrier and readiness variables. We entered treatment assignment last to examine the role of motivational interviewing in the context of barriers and readiness. The dependent variable for the analysis was whether or not individuals presented for a physical activity planning interview at our fitness center (ie recruited).

Results

Overall, study results were statistically significant for both environmental and readiness effects on recruitment. Examining the regression results hierarchically, the

block of demographic variables was entered first. The only demographic variable to achieve statistical significance was education with those reporting 12 years of education being nearly five times more likely to be recruited, regardless of recruitment method, than those with less than 12 years (OR = 4.97; 95 CI = 1.08, 22.91). Next, we entered the five health promotion barrier sub scales using forward conditionality ($p_{\text{enter}} < .05$). Only the macro environmental scale entered with each unit increase on this scale (rng 0-3) being associated with a 51 percent decrease in likelihood of being recruited (OR .49, 95 CI = .27, .89). We entered the stage of change variables next. Contemplators were nearly fives times more likely to be recruited by either method than pre- contemplators (OR = 4.80; 95 CI = 1.00, 23.08). Individuals in the maintenance stage of change were nearly four times more likely to be recruited than pre contemplators, however, these results did not achieve statistical significance (OR = 3.88; 95 CI = .78, 19.25). Finally, we entered the experimental variable into the equation. Those receiving the Motivational Interview(s) were over three times more likely to be recruited into the exercise planning interview than those in the control condition (OR = 3.04, 95 CI = 1.27, 7.28). Table 2.3 includes the final logistic regression model for predicting those who came to the exercise planning interview (ie recruited; n = 32). The parameter estimates in Table 2.3 are different than those presented above because the Table 2.3 estimates include entry of all independent variables whereas the hierarchical presentation of results above show parameter estimates at each step in the model building procedure.

Given these logistic regression results, we examined the data for moderation effects (Baron and Kenny, 1986). We computed separate logistic regression equations of

the interaction between recruitment method and each of three potential moderators, education, stage of change and macro environmental barriers on recruitment. None of these interactions were statistically significant indicating that these three variables did not moderate the effect of recruitment method on attendance. Random assignment to

Table 2.3 Odds ratio and 95%CI for attending exercise planning session

Variable	Percent	Odds	95%CI
Age		1.01	.98, 1.05
Gender (male)	34.5	.86	.36, 2.05
Race (Caucasian)	90.2	.51	.10, 2.49
< 12 years education	20.5	1.00	
12 years education	37.3	5.15	1.06, 24.96
> 12 years education	42.3	3.57	.74, 17.26
Macro environment		.57	.31, 1.07
Pre contemplation	18.8	1.000	
Contemplation	31.3	4.52	.92, 22.9
Preparation	14.3	1.52	.22, 10.31
Action	7.1	2.92	.34, 25.09
Maintenance	26.3	3.89	.77, 19.65
Newsletter	53.1	1.000	
Motivational	46.9	3.04	1.27, 7.28
Interviewing			

treatment precluded mediation effects of education, stage of change, or barriers as their were no differences in these variables between treatment conditions.

Intervention Implementation Of the individuals assigned to the treatment condition (n=105), 44% were never contacted for one of three reasons: their telephone

had been disconnected (57%), they gave the wrong phone number to the research team (11%) or they could not be reached in five separate call attempts with post-card prompting (32%). Of the 56% we were able to contact, 47% scheduled an intake interview, 22% allowed at least one follow-up call but never scheduled an intake appointment and 31% declined both an intake interview and any further telephone contact. Finally, for those we were able to contact, the average call lasted 27.0 minutes (SD = 12.2). We did not collect data on distribution and use of newsletters sent to the control group. However, forward service and forward addresses were requested and the research records were updated to maximize implementation of this condition.

Discussion

The purpose of this randomized prospective study was to examine the relative contribution of readiness for change and environmental barriers to the movement of adults with disabilities into the preparation stage of change for developing a physical activity program by attending a physical activity planning session. Overall, results suggested that environmental barriers and readiness for change contributed to whether or not individuals attended a physical activity planning session.

Barriers to participation in the community continue to be a significant problem for people with disabilities, however, the role of barriers in physical activity participation has been elusive. By analyzing barriers into five dimensions, we were able to differentiate among different kinds of barriers. Only the macro environmental barrier was related to recruitment. This dimension includes items like transportation and the weather. It may

be that many individuals compensated for other kinds of barriers minimizing their effect on recruitment. Interestingly, the effect size of the macro environmental variable became statistically non-significant when analyzed with treatment condition. It may be that motivational interviewing helped individuals more realistically assess the barriers to participating in physical activity. In other research, we found that a similar cohort rated their barriers as 50% more problematic before engaging in health promotion than they actually experienced the barriers to be while participating in health promotion (Ravesloot, 2003). Finally, these results on barriers should be generalized cautiously. The role of barriers in preparing for physical activity in the sub population of people with disabilities who use wheelchairs would likely be far more pronounced than was evident in this study where only 18% of the sample used a wheelchair.

These are the first published results on Stage of Change for exercise in this population. Just as the model predicts, those in contemplation were much more likely to attend the exercise planning interview than those in pre contemplation. Likewise, those who reported maintenance levels of physical activity were also more likely to be recruited to our exercise facility. Hence, the trans theoretical model functioned about as predicted in this study. Even more, stage of change predicted recruitment even after the variance for barriers had been removed suggesting that readiness to change exercise behavior is not solely a function of environmental factors.

These are also the first published findings for application of Motivational Interviewing with this population. These findings are very encouraging and suggest further application of this technique in this population may be useful for other behavior

change such as changes in diet, health risk reduction and even compliance with treatment. Importantly, we used an interviewer with training in clinical psychology and who had a disability herself. While she did not routinely reveal her disability status, results may have been different with an interviewer who did not have a disability.

We examined these results for moderation effects to further understand the relationship between motivation, barriers, readiness, and education. The absence of effects in the moderation analysis suggest that while barriers, education and stage of change influenced recruitment rates across both recruitment conditions, the treatment effect for Motivational Interviewing was independent of these variables. Participants in the treatment condition were recruited more often regardless of their level of barriers, education or stage of change.

While the relative effectiveness of the Motivational Interviewing is encouraging, the number of people recruited across both treatment conditions was small ($n = 32$). We identified three factors that may have contributed to this low rate of recruitment. First, we began recruitment in August 2001. After September 11, 2001 we noted a marked decrease in attendance at our fitness among our regular attendees who were not a part of this study for approximately one month. It is likely that individuals contacted for some period after September 11 were less likely to be recruited than they would have been without the national tragedy. Second, approximately one-third of our sample indicated a co morbid mental disorder to a physical impairment. We may have seen higher rates of recruitment had our sample had lower mental disorder rates. Finally, Medicaid is an entitlement program based on largely on income. We noted that the very low income

level of this cohort put them at risk for a myriad of difficulties that often interrupted their best efforts at health behavior change (eg car trouble).

Our purpose for conducting this study was to examine movement into the preparation stage of change for physical activity in our exercise facility. Hence, once individuals had scheduled an intake interview, we did not provide further Motivational Interviewing. Of those who attended the exercise planning interview ($n = 32$), 68.8% moved into the action stage by attending at least one exercise session. This study suggests that future research utilizing motivational interviewing as in intervention targeting maintenance of physical activity behavior is a promising strategy worth investigating.

While these results begin to shed light on the relationship between readiness for change and barriers in physical activity adoption for this population, this study had a number of limitations to consider when interpreting results. First, this study probably attracted the most educated and motivated people limiting generalization. Next, exposure to the independent variables was small for the MI group (56%) and unknown for the control group. Therefore, we cannot speak to which of these two methods is more efficacious. This study was conducted from an effectiveness perspective that does not assume equal exposure to the independent variable (Glasgow *et al.*, 2003; Goldfried and Wolfe, 1996). It may be that more individuals were contacted through the motivational interview than the newsletter, which could account for these results. Finally, because this study was conducted in the natural context, the overall proportion of individuals who attended a physical activity planning interview was small. Hence, estimates of effects

reported here could vary widely from effects estimated from either a larger study or from a different cohort.

Finally, we conducted this study as an effectiveness study to make specific recommendations about facilitating exercise behavior change of people with physical impairments. Based on these results, it appears important to address environmental barriers and stage of change. The leading indicator of the macro environmental barrier dimension was transportation suggesting that physical activity programs probably need to help people arrange transportation if not actually provide it. With respect to stage of change, this study provides support for matching communication to stage of change with flexible interventions such as Motivational Interviewing. The cost-effectiveness of this approach relative to sending out mailed materials would probably depend on the size of the target population within a specified geographic location. In areas with a large population, mailed materials may recruit sufficient numbers to conduct programmatic activities. However, for smaller populations based on either eligibility criteria (eg specific impairment groups) or low population density, a combination of mailed materials and active health communication strategies might be necessary to achieve sufficient numbers for program implementation.

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Chapter 3

Study Two

The Reliability of Self-Reported Healthcare Utilization Using a Computer Assisted Assessment Strategy

The Reliability of Self-Reported Healthcare Utilization Using a Computer Assisted Assessment Strategy

The gold standard for cost-effectiveness research takes the societal perspective on costs (Russell, Siegel, Daniels, Gold, Luce and Mandelblatt, 1996; Stone, Chapman, Sandberg et al. 2000). However, most cost analyses rely on administrative claims data sets for cost values. Luce, Manning, Siegel & Lipscomb (1996) suggest that in addition to claims data to estimate healthcare utilization, research should micro-cost service utilization through alternative strategies when possible. Further, claims data do not include estimates of personal time used for obtaining healthcare which is essential information for adopting the societal perspective in cost effectiveness research.

The second study of this research assessed the validity of self-reported healthcare utilization by Medicaid beneficiaries and collected personal time for pursuing healthcare services. Our main hypothesis for study two was that regular recording of healthcare service utilization by study participants would develop a reliable record of service utilization when compared with administrative claims data and office/treatment notes.

Methods

Participants Participants for the study were 179 adults with mobility impairments who were 52.5 (SD = 14.6) years old and were approximately 2/3 female (63%). The sample was predominately Caucasian (93.8%) and represented a wide variety of different physical impairments. The most common impairments included fibromyalgia (12.4%), arthritis (10.2%) and back pain (10.2%). Additionally, this sample represented four different cohorts. First, 32 (19.0%) individuals were Medicaid beneficiaries recruited into the exercise program as part of study one on exercise recruitment. Another 37 (20.7%) individuals were Medicaid beneficiaries not recruited as part of the larger study. There were 22 (12.3%) individuals who were exercising at the

time this study began, but were not Medicaid beneficiaries and there were another 85 (47.5%) individuals who were new to the exercise program during this study, but were not Medicaid beneficiaries.

To assess the validity of the measure, we asked Medicaid beneficiaries for consent to collect office notes from their primary care physicians and claims data from the State Department of Medicaid over the course of the 24-month study. We collected data on 17 individuals who met study criteria and consented to participate

Measures We developed the Computer Assisted Health Resource Utilization System (CAHRUS) for this study. CAHRUS uses a touch screen interface to query participants about the medical services they used during the previous seven days. The services queried were physician visits, extended hour walk in clinics, emergency room visits, outpatient surgeries, nights in the hospital, and allied health services (e.g. physical therapy, occupational therapy, counseling, etc.). Additionally, CAHRUS has participants estimate the amount of personal time they spent accessing the services as well as the amount of time their paid or unpaid personal assistant helped them access services.

The CAHRUS assessment strategy used six screener questions on the first screen with follow up questions that collected more specific information about each visit on subsequent screens. Additionally, when a healthcare service had been used, personal time variables were always asked. The questions asked through CAHRUS are included in Appendix C.

In addition to measures collected with CAHRUS, we collected two other measures of healthcare service utilization. First, we collected medical service utilization claims data from the State Department of Medicaid for study participants. Next, we collected the treatment/office notes for visits to practitioners.

CAHRUS Administration Procedures Study participants used two computers

set up in our fitness program to “sign in” for their exercise sessions. The computer program first asked for a unique identifier and then proceeded to the tailored assessment of healthcare service utilization. In order to maximize usage of CAHRUS, after responding to the service utilization questions the program printed the individual’s personalized workout sheet that listed cardio vascular and strength exercises including duration, weights, repetitions, sets and exercise equipment settings. People used these workout sheets to guide their exercise program in the fitness center.

Data Analysis CAHRUS stores data in a Microsoft Access database. All data were examined for outliers and converted for analysis using the Statistical Package for the Social Sciences version 12.0 (SPSS 12.0). Data were aggregated by month to examine agreement between the three data sources. The percent of agreement across data sources for each time period was assessed using the Kappa Index (Portney & Watkins, 1993). First, the inter rater reliability between raters of the office notes was assessed. Then, the Kappa Index was computed comparing physician visits from CAHRUS to physician visits from the office notes. Next, the Kappa Index was computed to compare the number of physician visits collected with CAHRUS to the number of physician visits according to Medicaid Claims data. Finally, the Pearson correlation was computed between the total healthcare expenditures collected by CAHRUS and the Medicaid Claims data.

Results

The office notes collected for physician visits were coded by two different graduate research assistants. The kappa index was computed to examine the interrater reliability. The raters coded 388 observations with 86% agreement. Next, the ratings from both observers were compared to the data collected with CAHRUS. Again, over 388 observations, the agreement between the observers and CAHRUS were 71% and

63%.

Medicaid claims data were procured for these same subjects and the Kappa Index was computed between the claims data and CAHRUS. These two data sources had 61% agreement. Inspection of the raw data, however, indicated much of the disagreement between sources came from inconsistencies in services reported for the exact time period being compared. We calculated the Pearson r for the total number of visits for each subject across all time periods, which was .93. Hence, while the unit by unit agreement between data sources was only moderate, the CAHRUS data provided an accurate measure of overall healthcare costs when compared to the Medicaid claims data.

In order to assess costs of care, we used Medicare cost estimates for the services queried by CAHRUS. Descriptively, healthcare utilization data indicated that the total cost of medical services during the 22 months of the study was \$142,916. Table 3.1 lists the separate costs for each service queried. Of even greater interest is the amount of time spent procuring medical services by the participant and care giver. Overall, participants reported spending 2382 hours obtaining healthcare and reported that a care giver attended visits with them for 1516 of those hours. Hours for nights in the hospital were not collected, so the average time spent per outpatient visit was 2.5 hours. Finally, we anticipate the nights spent in the hospital is underestimated because of the interaction between the intervention (i.e. exercise) and the measure (i.e. nights in the hospital). That is, hospital admissions probably predict dropout from the exercise program which discontinues the CAHRUS measurement method.

Table 3.1 Total costs collected for each healthcare service

Service	Count	Cost
Physician visit	807	\$55,683
ER visits	43	\$5,676
Extend hour clinic visits	67	\$2,814
Outpatient surgeries	37	\$15,503
Nights in the hospital	60	\$63,240

Discussion

Study 2 examined the utility of the Computer Assisted Healthcare Utilization System (CAHRUS) assessment strategy for collecting healthcare utilization data. While not perfect, it does appear to estimate overall costs relatively well. When assessed for the correspondence between overall claims data and CAHRUS, the two indicators are very similar.

One limitation in the study was our ability to assess the validity of more specific information about the healthcare visit. One would expect that the validity would be inversely related to the level of specificity queried. Unfortunately, we found significant gaps in the office notes as we searched for more specific information and were unable to match the services we queried with the claims data with acceptable reliability. Hence, our analysis reflected only the occurrence of visits, the least specific indicator of utilization.

While the CAHRUS method may not be superior to claims data for direct healthcare costs, it clearly adds to our ability to discuss indirect costs such as personal time spent accessing services. We also could have easily queried about satisfaction with services and other patient-centered outcomes of care. Hence, the CAHRUS method could have a valuable role in cost-effectiveness research.

This was a methodological study to assess whether or not we could get this population to use CAHRUS and to examine the validity of data collected. As such, the estimates of service utilization are not presented to be reflective of the general population of people with physical impairments, but rather to show the number of occurrences collected by the measurement system. Even so, this population reported significant healthcare service utilization as we would expect. Even more, the amount of time spent pursuing the care is quite staggering.

In a true economic evaluation, we would calculate the value of time spent pursuing healthcare. This is typically computed through lost productivity related to the value of work that could have been performed during the same time period. This creates an interesting problem. How should we value the time of people retired or disabled many of whom are drawing disability benefits? To suggest their time has no value is untenable. Nonetheless, we have been unable to identify good models for valuing the time of this population.

Finally, the CAHRUS method would be a valuable tool for collecting data whenever researchers have frequent contact with participants and wish to collect data on any event with a low base rate. Our fitness center was a perfect environment for this application. However, other clinical settings looking to collect information on low base-rate events might find the computer program equally valuable.

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Chapter 4

Study Three

Predicting Healthcare Utilization from Exercise Completed by People with Physical Impairments

Predicting Healthcare Utilization from Exercise Completed by People with Physical Impairments

Very little is known about the potential economic impact of exercise performed by adults with mobility impairments living independently in the community. This despite the growing number of reports that demonstrate the benefits of exercise for this population. For example, exercise training improves peak $\dot{V}O_2$, strength and body composition in African American adults with multiple impairments (Rimmer, Nicola, Riley & Creviston, 2002), decreases handicap in adults with SCI (Mannas and Chad, 1999) and improves functional ability and decreases pain in adults with Arthritis (Hakkinen, Sokka, Lietsalmi, et al., 2003).

At the same time, people with disabilities defined as having more than one limitation in activity of daily living (14%) account for 32% of medical expenditures (Trupin, Rice & Max, 1995). While there have been few studies of the economic impact of exercise on people with mobility impairments, exercise has been linked to health care cost savings in other populations (Hatziandreu, Koplun, Weinstein, Caspersen & Warner, 1988). For example, the healthcare costs of a sample of veterans incurred over the course of one year were predicted from their exercise capacity (Weiss, Froelicher, Myers & Heidenreich, 2004). Weiss et al (2004) reported that METs expended in an exercise test was the best predictor of costs in a multivariate analysis that adjusted for demographics and disease status. In unadjusted analysis, each increase of one MET predicted a 5.4% decrease in healthcare costs.

Study three of this research project used the computerized measurement method from study two to examine the relationship between exercise and the cost of outpatient medical care. The purpose of this study was to examine covariation over time of the amount of exercise performed by participants with mobility impairments accessing our

fitness program and the cost of their healthcare during that same period.

Methods

Participants Participants for the study were 179 adults with mobility impairments who used our fitness center during a 22-month period between September 2001 and July 2003. These individuals were on average 52.5 (SD = 14.6) years old and were approximately 2/3 female (63%). They were predominately Caucasian (93.8%) and represented a wide variety of different physical impairments. The most common impairments included fibromyalgia (12.4%), arthritis (10.2%) and back pain (10.2%). Additionally, this sample included four different cohorts. First, 32 (19.0%) individuals were Medicaid beneficiaries recruited into the exercise program as part of study one on exercise recruitment. Another 37 (20.7%) individuals were Medicaid beneficiaries not recruited as part of the larger study. There were 22 (12.3%) individuals who were exercising at the time this study began, but were not Medicaid beneficiaries and there were another 85 (47.5%) individuals who were new to the exercise program during this study, but were not Medicaid beneficiaries.

Measures Measures for this study were collected with the Computer Assisted Healthcare Resource Utilization System (CAHRUS). This touchscreen computer served two functions for the current project. First, we used the program to query exercise participants about their healthcare utilization using a seven-day recall. In order to estimate the costs associated with these visits, we queried participants about physician, immediate care and emergency room visits, outpatient surgeries and nights in the hospital. We used 2002 Medicare estimates (i.e. \$69.00 per physician visit) to approximate service costs. Second, we used the system to track the number of exercise visits for each person by date. We also tracked the amount of work performed during each exercise visit in both strength training and cardiovascular training units. Strength

units were computed by multiplying the amount of weight by the repetitions lifted across strength training equipment (Life Fitness, Chicago IL). Cardiovascular units were computed by multiplying duration by resistance or level and speed (e.g. Life Fitness treadmill incline percent X speed X duration = cardio units).

Setting and Procedures This study was conducted in the context of our community-based wellness center for people with disabilities called the New Directions Program. This program was housed in a 2000 square foot facility that included clinical office space for interviewing clients, a group room for conducting health education and a 1,000 square foot fitness facility that housed state-of-the-art Life Fitness (Chicago, IL) fitness equipment and specialized fitness training equipment for people who use wheelchairs.

Study participants gave informed consent to participate in the study and were then instructed on the use of the touchscreen interface. Once they had completed the assessment, a daily workout sheet was printed. This workout sheet included the duration and level for cardiovascular equipment and the sets and repetitions for the strength training equipment that the person completed during their three previous exercise visits. Then, they used the exercise sheet to guide their workout and record the amount of exercise completed that day. These values were then entered into their daily exercise record to track changes in duration and intensity of exercise.

Data Analysis We used time series regression analysis to investigate the relationship between the amount of exercise performed and the number of visits made to the doctor using SPSS 12.0. For these analyses, we divided visits reported over 22 months into 45 15-day periods. Because physician visits were reported most frequently (84% of all visits representing 70% of all costs), we focused analyses on these visits first and then recomputed analyses using all health care visits reported to check for substantive

differences. We analyzed data in eight steps using two sets of independent variables and transformations three transformations of the dependent variable. We present each step in the results to show the consistency of results across different analyses and to demonstrate the process we used to arrive at the final model in step eight.

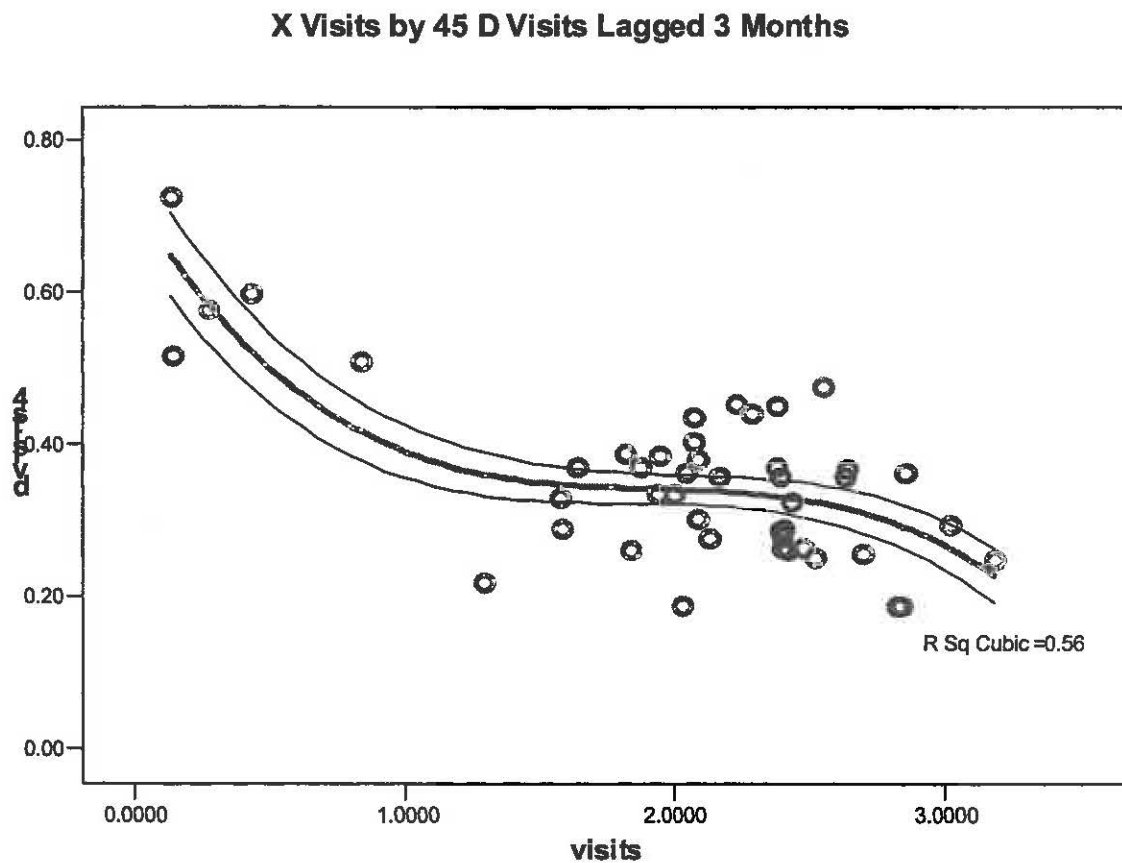
Results

Descriptively, the average cost of all healthcare visits (excluding hospitalization) across all 45 15-day time periods was \$39.66 (SD = 42.86). During these same time periods, participants made an average of 2.05 exercise visits. The average percentage of Medicaid beneficiaries was 39.8%, the average percentage of those recruited through the larger study was 22.9% with the remainder (i.e. neither Medicaid or recruited) representing 35.2% in these analyses.

For step one of the analysis, we computed a correlation matrix of exercise visits, exercise visits squared, exercise visits cubed and doctor visits lagged from 0 to 45 15-day periods. In this matrix, the magnitude of the negative relationship between average number of doctor visits and average number of exercise visits increased to the sixth 15 day period and then decreased. This suggested the effect of exercise on average number of doctor visits was greatest about 3 months after the exercise had occurred. On this basis, we lagged doctor visits by six 15-day periods (i.e. 3 months; lag3) in subsequent analysis.

Our second step in the analysis simply regressed doctor visits lag3 on the three exercise visit variables (i.e., first to third power). This model accounted for 56% of the variance in doctor visits made three months after exercise occurred ($F_{(3,41)} = 17.42, p < .000$). Figure 4.1 includes a plot of the doctor visit lag3 values by exercise visits.

Figure 4.1 Average number of exercise visits plotted against average number of doctor visits three months later



At the third step in our analysis, we examined raising the dependent variable (doctor visits Lag3) to the 2nd through 9th powers to construct the most predictive model possible. Examining these transformations of the dependent variable, we determined that raising doctor visits lag3 to the 4th power was best predicted by exercise visits (0 to 3rd power). Again, a cubic model emerged that accounted for 71% of the variance ($F_{(3,41)} = 33.50, p < .000$) in doctor visits Lag3 and raised to the 4th power.

At the fourth step in our analysis, we transformed the independent variable into more specific exercise units by using the exercise data tracked with CAHRUS. In

addition to using these units, as with previous analysis, we raised these root units to the 2nd and 3rd power. Similar to the analysis in step 3, we used the dependent variable doctor visits lag3 raised to the 3rd or 4th power. The first model we tested used the cardiovascular unit variables (i.e., 1st to 3rd power) to predict doctor visits Lag3 to the 3rd. This cubic model predicted 61% of the variance ($F_{(3,41)} = 21.59, p < .000$). Next, we used strength training unit variables to predict doctor visits lag3 to the 4th. Again, the cubic model emerged and accounted for 78.1% of variance ($F_{(3,41)} = 48.69, p < .000$). Lastly, we combined strength and cardiovascular exercise units to approximate overall physical work performed during each two-week interval. Regressing doctor visits lag3 to 4th power on these total work unit variables (0 to the 3rd power) resulted in a similar model that accounted for 77.9% of the variance ($F_{(3,41)} = 48.27, p < .000$). These results show that the number of doctor visits three months later is highly related to the amount of work with exercise work related to fewer doctor visits.

In the fifth step of these analyses we transformed the doctor visits into dollars (Dcost), cubed them and used the same exercise visit variables (0 to the 3rd power) as predictors. Additionally, we added predictor variables to reflect changes in the sample over time that might account for the observed cubic relationship in all previous analyses. This backwards model building analysis resulted in a quadratic relationship between doctor visits lag3 to the 3rd power and exercise visits accounting for 72.2% of the variance ($F_{(5,39)} = 20.29, p < .000$). Not all regression coefficients in this model were statistically significant, however. The stepping procedure eliminated the cubed exercise visit term. In this model, inclusion of variables representing changes in the sample over time accounted for variance attributable to the cubic term in prior analyses. In this analysis, a 1% increase in the proportion of the sample recruited in study one predicted a 30.0% decrease in costs attributable to doctor visits.

The sixth step in our analysis used the same predictor variables in the previous step to predict other categories of healthcare utilization and total costs of healthcare utilization. As with previous analyses, the dependent variables were lagged by 3 months and cubed. We first examined costs associated with extended-hour walk-in clinic visits using forward modeling (Probability $F_{\text{enter}} < .121$). This procedure produced a quadratic model that accounted for 43.1% of variance in clinic costs ($F_{(2,42)} = 19.53, p < .000$). Only the exercise visit root ($p < .004$) and squared ($p < .121$) variables entered the equation.

Next, we examined the costs of emergency room visits. We regressed the costs of ER visits lag3 and cubed onto the same set of predictors using backward modeling (Prob $F_{\text{remove}} < .10$). This procedure generated another quadratic model, only this model included all three cohort variables and accounted for 72.2% of variance in cost of ER visits ($F_{(5,39)} = 20.30, p < .000$).

Next, we examined costs due to outpatient surgery. There were no significant relationships between costs due surgery and exercise visits or cohort characteristics over time.

At the seventh step, we examined costs for the aggregate of all healthcare costs except outpatient surgical visits. We regressed all non-surgical costs lag3 squared on the same set of predictor variables using backwards modeling (Prob $F_{\text{remove}} < .10$). This procedure produced a cubic model that accounted for 68.6% of the variance in total non-surgical costs ($F_{(4,40)} = 21.81, p < .000$).

Inspection of the terms in this model (i.e. costs of all non-surgical outpatient visits regressed on exercise visits) suggested that each increase of one visit per 15-day period, predicted a 166% reduction in costs. Interestingly, Medicaid beneficiaries reported higher use of physician services. Hence, the model predicts that a 1% increase in the proportion of the sample on Medicaid would increase costs by 19.3%, assuming services

rendered across the three cohorts in this study were reimbursed at the same rate.

The eighth and final step in these analysis examined regressing the non-surgical healthcare costs on the cardiovascular and strength training units. In these analyses, cardiovascular units accounted for 57% of the variance in healthcare costs lag3 cubed ($F_{(3,41)} = 17.89, p < .000$) and strength units accounted for 77.1% of the variance ($F_{(3,41)} = 33.67, p < .000$). Combining these units did not produce a better model. Table 4.1 includes the regression coefficients at each step of the model building procedure for non-surgical healthcare costs cubed (lag3) regressed on strength training units. Inspection of this table shows that each unit increase in average strength training predicted a 7.5% reduction in healthcare costs. Note that the average number of strength units for exercise sessions during a 15-day period is 37K, so a ten unit increase in the average number of strength units during the period represents a 36.9% reduction of healthcare costs, while a one unit increase in the average percentage of Medicaid participants would represent a 50.4% increase in non-surgical healthcare costs.

Finally, the simple correlation between the doctor visits dependent variable and its cube is .929 ($R^2 = .863$). The simple correlation between the predicted doctor visits dependent variable session means and the doctor visits dependent variable root translation of those amounts is .958 ($R^2 = .918$). Similarly, the simple correlation between all non-surgical costs and its square is .970 ($R^2 = .941$), while the simple correlation between predicted non-surgical costs and the root translation of those amounts is .978 ($rsq = .956$). These figures indicate very close relationships between actual and predicted session means of doctor visits and non-surgical dollars and their transformed versions.

Table 4.1 Regression Coefficients for non surgical costs lag3³ regressed on strength training units and sub populations

Model		B	Std. Error	Beta	t	Sig.	95% Confidence Interval for B	
							Lower Bound	Upper Bound
1	(Constant)	1432.44	61048.97		.02	.98	-122154.74	125019.63
	Strength Training Units	-14.44	2.45	-4.04	-5.90	.00	-19.39	-9.49
	Strength Training Units Squared	.00	.00	6.94	4.64	.00	.00	.00
	Strength Training Units cubed	.00	.00	-3.39	-3.71	.00	.00	.00
	Mean Percentage Medicaid	5478.43	1484.63	.50	3.69	.00	2472.96	8483.90
	Mean Percentage Recruited	-1155.06	1661.75	-.12	-.70	.49	-4519.10	2208.99
	Mean Percentage Other Client	378.53	650.91	.09	.58	.56	-939.17	1696.22
	(Constant)	14631.04	56190.41		.26	.80	-99024.79	128286.88
2	Strength Training Units	-13.92	2.26	-3.90	-6.17	.00	-18.48	-9.35
	Strength Training Units Squared	.00	.00	6.73	4.68	.00	.00	.00
	Strength Training Units cubed	.00	.00	-3.30	-3.69	.00	.00	.00
	Mean Percentage Medicaid	5702.32	1421.62	.52	4.01	.00	2826.81	8577.82
	Mean Percentage Recruited	-1842.89	1157.30	-.19	-1.59	.12	-4183.74	497.96
	(Constant)	32195.27	56144.95		.57	.57	-81277.90	145668.44
	Strength Training Units	-13.77	2.30	-3.86	-5.99	.00	-18.42	-9.13
	Strength Training Units Squared	.00	.00	6.74	4.60	.00	.00	.00
3	Strength Training Units cubed	.00	.00	-3.37	-3.70	.00	.00	.00
	Mean Percentage Medicaid	4127.72	1040.82	.38	3.97	.00	2024.14	6231.31

a Dependent Variable: NSRG\$63 Non-surgery Medical Costs (lag3mo, cu)

Discussion

This study examined the relationship between exercise and health care costs in a cohort of people with mobility impairments using a semi-structured exercise program. We used time series regression analysis to examine the relationship between exercise conducted at time one and healthcare utilization three months later. Overall, the relationship between exercise and health care costs in this cohort was astonishing.

Shortcomings of the study include possible instrumentation effects. Participants may have reported fewer healthcare visits over time due to the demands of reporting healthcare usage on a weekly basis. On the other hand, it could be argued that the frequency with which utilization was queried heightened people's awareness resulting in a positive reporting bias. Study two in this research project, while small in scale, suggested that overall, the healthcare services identified with the CAHRUS program correlated highly with Medicaid claims data. A strong negative reporting bias over time would have rendered CAHRUS unreliable in study two.

This is one of the first reports to show the potential cost savings of making exercise services available to people with disabilities. Overall, the trend for the exercise program was an increase in the average number of exercise visits over time with a decrease in healthcare visits that was most pronounced three months later. Visual inspection of Figure 4.1 clearly shows the relationship presented in the statistical results.

Transformations of the healthcare visits into dollars and the exercise visits into strength training units increased the efficiency of the model. We presented regression

outcomes using a number of different analytic strategies to demonstrate how robust the results were in these data.

The treatment effect was consistent across the four sub populations of the study sample, however, Medicaid beneficiaries tended to use more healthcare services than non-Medicaid beneficiaries. Hence, the study suggests that a research program specifically designed to examine the cost-effectiveness of getting Medicaid beneficiaries with disabilities to adopt an exercise program might be very worthwhile.

The specific results on healthcare utilization for the sub sample of those who were recruited in study one were dependent on which independent variables were included in the model. When the model included exercise visits, the proportion of the sample who were recruited in study one predicted decreased costs from doctor visits. However, when the independent variable was strength training units, the proportion recruited was no longer statistically significant. It appears that the recruitment method influenced the number of exercise visits made, but not the number of strength units performed. This provides additional support for the effectiveness of the recruitment method in study one and demonstrates the added influence of strength training on costs above and beyond mere program attendance.

The external validity for this study seems very strong, especially for Medicaid beneficiaries with mobility impairments. Participants were instructed on how to begin their exercise programs, but they were not “actively” trained by an exercise specialist. Instead, individuals freely choose the intensity and duration of each exercise visit and their overall exercise program. Hence, this study more closely reflects outcomes that

might be observed in a real world exercise program rather than a tightly controlled exercise study.

Future research in this area might examine whether psychological, social or physiological variables mediate or moderate the relationship between exercise and healthcare utilization. We cannot determine whether individuals in this study had less need for healthcare services over time or simply reduced their use of unnecessary services. Likewise we cannot determine whether the reduced healthcare services effect is due to psychological, social or physiological variables. On observation, people reported enjoying the social aspect of participation. However, people also gained substantial strength and reported functional and participation gains as a result. Hence, it is possible they simply were busy following other pursuits, rather than accessing medical services. Lastly, many participants reported ongoing pain. Regular physical activity is a central component of pain management. Hence, reduction in pain could also have mediated the relationship between exercise and healthcare service use in this study.

Unfortunately, this study was not designed to assess the cost-utility of exercise in this population. The main shortcoming being that we did not collect a measure of quality of life for computing quality adjusted life years. Nonetheless, this study points to the potential cost savings of providing exercise services to adults with mobility impairments.

Together the three studies of this research project paint an encouraging picture of the role exercise may take in the ongoing healthcare of people with disabilities. Study one began to suggest methods to improve recruitment of people into exercise programs. Study two demonstrated a useful strategy for measuring healthcare utilization and exercise. Study three examined the impact of exercise on healthcare utilization for this

population and found substantial promise for cost savings by adding exercise services to the service traditionally funded through insurance programs.

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APPENDICES

Appendix A

Paper and Pencil Measurement Instruments

HEALTH SURVEY

**THE UNIVERSITY OF MONTANA
RURAL INSTITUTE ON DISABILITIES
NEW DIRECTIONS
1605 STEPHENS
MISSOULA, MT 59801
(406) 543-9356**

Craig Ravesloot, Ph.D.
New Directions
1605 Stephens
Missoula, MT 59801
(406)543-9356

HEALTH RESEARCH PROJECT INFORMED CONSENT FOR SURVEY I

Thank you for your interest in the Exercise and Health research project being conducted by the New Directions Program of the University of Montana. We are doing this project to learn how to inform people with medical problems about the benefits of exercise. We are also hoping to help adults with ongoing medical problems to develop an exercise program for themselves.

If you agree to participate in this project by signing this form and returning the enclosed survey, you will answer questions about your current exercise habits, your medical problems, and the problems you have with going out to community events. When we receive your survey, we will mail you a check for \$10.00.

Your name will never be connected to the answers given on the survey. Your records will be kept private and will not be released without your consent except as required by law. The information will be kept in a locked file cabinet at the University of Montana for 3 years. Your signed consent will be stored separately. Only the research staff will have access to the information. Otherwise, it will be kept totally confidential. No one else will know about your health status.

“In the event that you are injured as a result of this research you should individually seek appropriate medical treatment. If the injury is caused by the negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A., Title 2, Chapter 9. In the event of a claim for such injury, further information may be obtained from the University's Claims representative or University Legal Counsel. (Reviewed by University Legal Counsel, July 6, 1993)”

We do not think this study will hurt you in any way.

If you have any questions, you may contact Craig Raveslout, Ph.D, New Directions, 1605 Stephens, Missoula, MT 59801 (406) 543-9356. By signing this form, you are consenting to participate in this study.

I understand this consent form. I have been informed of the risks and benefits involved in completing this survey and all my questions have been answered. I know that I can call Craig Raveslout with any more questions I may have.

I voluntarily agree to take part in this study.

Signature

Date

First Name: _____

Last Name: _____

Street Address or PO: _____

City: _____ State: _____

Zip Code: _____

Telephone Number: _____

Social Security Number (for reimbursement purposes):

DEMOGRAPHIC INFORMATION

In order to better understand the health care needs of people with disabilities, we need to find out specific information about you.

PERSONAL

Date of Birth: _____

Sex: ___ Male
 ___ Female

County of Residence: _____

Years of Education (including 1st grade and beyond): _____

Marital Status: ___ Single
 ___ Married
 ___ Separated

RACE

___ White
___ Black or African American
___ American Indian or Alaska Native
___ Native Hawaiian of Other Pacific Islander
___ Asian

ETHNICITY

___ Hispanic or Latino
___ Not Hispanic or Latino

EMPLOYMENT STATUS (check ✓ all that apply)

___ Not Currently Employed ___ Employed Part-Time ___ Employed Full-Time
___ Retired ___ Homemaker ___ Student
___ Volunteer

HEALTH CARE COVERAGE (check ✓ all that apply)

___ Medicaid ___ Medicare
___ VA, CHAMPUS, CHAMP-VA ___ Indian Health Service
___ Private Health Insurance ___ No Health Insurance

PRIMARY DISABILITY INFORMATION

Please indicate the nature of your primary disability and approximate date of its diagnosis.

What is the **MAJOR IMPAIRMENT OR HEALTH PROBLEM** that limits your activities?

- | | |
|---|---|
| <p><input type="checkbox"/> Arthritis / Rheumatism</p> <p><input type="checkbox"/> Spinal Cord Injury (level of injury _____)</p> <p><input type="checkbox"/> Multiple Sclerosis</p> <p><input type="checkbox"/> Back or neck problem</p> <p><input type="checkbox"/> Mental Disorder (depression, anxiety, or emotional problem)</p> <p><input type="checkbox"/> Hypertension / high blood pressure</p> <p><input type="checkbox"/> Stroke problem</p>
<p><input type="checkbox"/> Heart problem</p> <p><input type="checkbox"/> Diabetes</p> <p><input type="checkbox"/> Cerebral Palsy</p> <p><input type="checkbox"/> Post Polio</p> | <p><input type="checkbox"/> Traumatic Brain Injury</p> <p><input type="checkbox"/> Mental Retardation</p> <p><input type="checkbox"/> Muscular Dystrophy</p> <p><input type="checkbox"/> Cancer</p> <p><input type="checkbox"/> Amputee</p> <p><input type="checkbox"/> Fractures, bone/joint injury</p> <p><input type="checkbox"/> Walking problem (Specify)</p>
<p><input type="checkbox"/> Lung / breathing problems</p> <p><input type="checkbox"/> Hearing problems</p> <p><input type="checkbox"/> Eye / vision problems</p> <p><input type="checkbox"/> Other Impairment (Specify)</p> |
|---|---|

DATE

What is the approximate date of diagnosis for the condition you experienced first:

OVERALL HEALTH AND INDEPENDENCE

Please rate your overall health and independence over the past two months.

Overall, would say your **HEALTH** over the past two months was:

Excellent

Good

Fair

Poor

Overall, would you say your ability to **INDEPENDENTLY** engage in desired activities such as work, recreation or daily living over the past two months was:

Excellent

Good

Fair

Poor

CURRENT EXERCISE HABITS

1. I currently do not exercise.

True False

2. I intend to exercise in the next six months.

True False

3. I currently exercise *regularly*.

True False

4. I have exercised *regularly* for the past six months.

True False

5. I have exercised *regularly* in the past for a period of at least 3 months.

True False

Please turn to the next page

POTENTIAL PROBLEMS WITH GOING TO EVENTS

We are interested in how easy or difficult it would be for you to visit the New Directions health promotion program twice a week for six months. If you are currently coming to the New Directions program, please rate the difficulty you have with each item. For each statement, circle the number that represents how difficult it would be for you to attend twice weekly exercise or a similar activity. If a statement does not apply to you or if it would not be a problem for attending a health promotion program, please rate it as zero.

	Not a problem			A big problem
1. It's difficult to get in and out of my house.	0	1	2	3
2. My neighborhood has too few curb cuts.	0	1	2	3
3. It is dangerous for me to leave my house.	0	1	2	3
4. It would take too long to get to the program.	0	1	2	3
5. Chemicals in the environment bother me.	0	1	2	3
6. The weather is often too bad to get out.	0	1	2	3
7. I have trouble reading printed materials.	0	1	2	3
8. Buildings are not accessible to me.	0	1	2	3
9. I don't have accessible transportation.	0	1	2	3
10. I don't have the assistive equipment that I need.	0	1	2	3
11. My disability is limiting me too much these days.	0	1	2	3
12. I have a hard time thinking and concentrating.	0	1	2	3
13. I lose control over my bowel and bladder functions.	0	1	2	3
14. My weight makes it hard to get around.	0	1	2	3
15. I get tired easily.	0	1	2	3

	Not a problem			A big problem
16. I have pain when I do too much.	0	1	2	3
17. I can't see well enough to get around.	0	1	2	3
18. I have trouble hearing what people say.	0	1	2	3
19. I have to take time off from my job.	0	1	2	3
20. I'm too busy to take time away from other important activities.	0	1	2	3
21. I have to arrange day care for my children.	0	1	2	3
22. I take care of another family member.	0	1	2	3
23. My family will not support my coming.	0	1	2	3
24. My daily self-care needs take too much energy.	0	1	2	3
25. I need someone to help me.	0	1	2	3
26. My doctor will not approve of my coming.	0	1	2	3
27. Other important people tell me not to come.	0	1	2	3

Please turn to the next page

SECONDARY CONDITIONS

Please rate the limitations you experience from the following health conditions.

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

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

- 0 = Not experienced during past two months/insignificant problem (rarely or never limits activity or independence)
1 = Mild or infrequent problem (limits activity 1 to 5 hours per week)
2 = Moderate/occasional problem (limits activity 6 to 10 hours per week)
3 = Significant/chronic problem (limits activity 11 or more hours per week)

Examples: 0 1 2 3 **Restlessness**
If you feel that restlessness limits your activities moderately (6 to 10 hours per week) you would circle a "2".

 0 1 2 3 **Dry Skin**
If you feel dry skin does not limit your activities circle "0".

Secondary Condition	Description
0 1 2 3 Pressure Sores	These develop as a skin rash or redness and may progress to an infected sore. Also called skin ulcers, bedsores, or decubitus ulcers. Persons who use wheelchairs are at risk for developing pressure sores.
0 1 2 3 Spasticity (Muscle Spasms)	Spasticity refers to uncontrolled, jerky muscle movements, such as uncontrolled muscle twitch or spasm. Often spasticity increases with infection. Persons with multiple sclerosis, cerebral palsy, and spinal cord injury are among individuals at risk for developing spasticity.

- 0 = Not experienced during past two months/insignificant problem (rarely or never limits activity or independence)
- 1 = Mild or infrequent problem (limits activity 1 to 5 hours per week)
- 2 = Moderate/occasional problem (limits activity 6 to 10 hours per week)
- 3 = Significant/chronic problem (limits activity 11 or more hours per week)

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

Secondary Condition	Description
0 1 2 3 Bladder Dysfunction	Incontinence, bladder or kidney stones, kidney problems, leakage, urine backup, and associated problems are all symptoms of bladder dysfunction. Persons with impaired or absent muscle function in the area of the bladder are at risk for bladder dysfunction.
0 1 2 3 Bowel Dysfunction	Diarrhea, constipation, "accidents," and associated problems are signs of bowel dysfunction. As with bladder dysfunction, persons with impaired muscle function or paralysis in the abdominal region are most likely to have bowel dysfunction.
0 1 2 3 Urinary Tract Infections	This includes such infections as cystitis and pseudomonas. Symptoms include pain on urination, a burning sensation throughout the body, blood in the urine, and cloudy urine. Persons with multiple sclerosis and spinal cord injury are especially at risk for urinary tract infections.
0 1 2 3 Sexual Dysfunction	This includes dissatisfaction with sexual functioning. Causes for dissatisfaction can be decreased sensation, changes in body image, difficulty in movement, concern over bladder and bowel routines.
0 1 2 3 Dysreflexia	Dysreflexia (sometimes called hyperreflexia) results from interference in the body's temperature and blood pressure regulating systems. Symptoms of dysreflexia include sudden rises in blood pressure and sweating, skin blotches, goose bumps, pupil dilation and headache. It is often related to overflowing leg bags. Dysreflexia can also occur as the body's response to pain where an individual doesn't experience sensation.
0 1 2 3 Carpal Tunnel Syndrome	This is a nerve disorder in the hand that causes pain and loss of feeling, especially in the thumb and first 3 fingers. Symptoms include numbness or tingling in part of the hand, shooting pains up the arm, thumb weakness, frequent dropping of objects, and shiny, dry skin on the hand.
0 1 2 3 Postural Hypotension	This involves a strong sensation of lightheadedness following a change in position. It is caused by a sudden drop in blood pressure. Individuals with spinal cord injury or stroke may experience postural hypotension.

- | | |
|-----|--|
| 0 = | Not experienced during past two months/insignificant problem (rarely or never limits activity or independence) |
| 1 = | Mild or infrequent problem (limits activity 1 to 5 hours per week) |
| 2 = | Moderate/occasional problem (limits activity 6 to 10 hours per week) |
| 3 = | Significant/chronic problem (limits activity 11 or more hours per week) |

Secondary Condition	Description
0 1 2 3 Cardiovascular (Heart) Problems	This commonly involves high or low blood pressure and must be diagnosed by a physician because there are often no symptoms. Other heart problems may be signaled by fluid retention - usually resulting in swelling around the ankles.
0 1 2 3 Circulatory Problems	Swelling of veins, feet, or the occurrence of blood clots. Specify: _____
0 1 2 3 Respiratory Problems	Pneumonia and other respiratory tract infections can occur in disabled individuals. Symptoms of respiratory infections or problems include increased difficulty in breathing and increased secretions. Persons with quadriplegia, post polio, rheumatoid arthritis and multiple sclerosis are especially at risk for respiratory complications and infections.
0 1 2 3 Chronic Pain	This is usually experienced as chronic tingling, burning or dull aches. It may occur in an area that normally has little or no feeling.
0 1 2 3 Joint and Muscle Pain	This includes pain in specific muscle groups or joints. Individuals who must overuse a particular muscle group (e.g., persons with paraplegia who may strain shoulder muscles) or those who must put too much strain on joints are at risk of developing joint and muscle pain.
0 1 2 3 Depression	More than feeling blue. Symptoms include: extreme, long-term sadness, loss of pleasure in favorite things and activities, difficulty sleeping, weight loss or gain, thoughts of suicide and frequent and/or unexplained crying.

Secondary Condition	Description
0 1 2 3 Anger	Extreme displeasure with situations or persons that is difficult to forget.
0 1 2 3 Isolation	Isolation from social contact and support may be a problem for some individuals, and may be due to a loss of relationships or being house-bound.
0 1 2 3 Problems with Mobility	Many physically disabled individuals are troubled by difficulty with getting around due to a loss of strength or muscle control.
0 1 2 3 Alcohol / Drug Abuse	This involves use of alcohol and/or drugs.
0 1 2 3 Diabetes	Diabetes is a problem resulting from irregularities in blood sugar levels. Symptoms include frequent urination and excessive thirst. This condition is diagnosed by a physician. Native American individuals and persons who are overweight are at higher risk for developing diabetes.
0 1 2 3 Anemia	Anemia is a low level of iron in the blood and often occurs in conjunction with pressure sores. Symptoms include fatigue and low energy. This condition is diagnosed by a physician.
0 1 2 3 Sleep Problems/ Disturbances	Difficulty falling asleep or staying asleep, difficulty staying awake during the day, or waking up early are all sleep disturbances.

EXERCISE

This section looks at how confident you are that you'll participate in exercise when other things get in the way. Read the following items and circle the number that best expresses how each item relates to you in your leisure time. If you feel the item does not apply to you, please circle "0" on the line provided. Please answer using the following 5-point scale:

- 0 = Does not apply to me
- 1 = Not at all confident
- 2 = Somewhat confident
- 3 = Moderately confident
- 4 = Very confident
- 5 = Completely confident

(circle one number on each line)

<i>I am confident I can participate in regular exercise when...</i>	Does not apply to me	Not at all confident	Somewhat confident	Moderately confident	Very confident	Completely confident
1. I am under a lot of stress.	0	1	2	3	4	5
2. I am depressed.	0	1	2	3	4	5
3. I am anxious.	0	1	2	3	4	5
4. I feel I don't have the time.	0	1	2	3	4	5
5. I don't feel like it.	0	1	2	3	4	5
6. I am busy.	0	1	2	3	4	5
7. I am alone.	0	1	2	3	4	5
8. I have to exercise alone.	0	1	2	3	4	5
9. My exercise partner decides not to exercise that day.	0	1	2	3	4	5
10. I don't have access to exercise equipment.	0	1	2	3	4	5
11. I am traveling.	0	1	2	3	4	5
12. My gym is closed.	0	1	2	3	4	5

<i>I am confident I can participate in regular exercise when...</i>	Does not apply to me	Not at all confident	Somewhat confident	Moderately confident	Very confident	Completely confident
13. My friends don't want me to exercise	0	1	2	3	4	5
14. My significant other does not want me to exercise.	0	1	2	3	4	5
15. I am spending time with friends or family who do not exercise.	0	1	2	3	4	5
16. It's raining or snowing.	0	1	2	3	4	5
17. It's cold outside.	0	1	2	3	4	5
18. The road or sidewalks are snowy.	0	1	2	3	4	5

This section look at positive and negative aspects of exercise. Read the following items and indicate how important each statement is with respect to your decision to exercise or not to exercise in your leisure time. Please circle the number that corresponds to the following 5-point scale.

- 1 = Not important
- 2 = A little bit important
- 3 = Somewhat important
- 4 = Quite important
- 5 = Extremely important

If you disagree with a statement and are unsure how to answer, the statement is probably "not important" to you.

How important are the following opinions in your decision to exercise or not to exercise?

(circle one number on each line)

	Not important	A little bit important	Somewhat important	Quite important	Extremely important
1. I would have more energy for my family and friends if I exercised regularly.	1	2	3	4	5

	Not important	A little bit important	Somewhat important	Quite important	Extremely important
2. I would feel embarrassed if people saw me exercising.	1	2	3	4	5
3. I would feel less stressed if I exercised regularly.	1	2	3	4	5
4. Exercise prevents me from spending time with my friends.	1	2	3	4	5
5. Exercising puts me in a better mood for the rest of the day.	1	2	3	4	5
6. I feel uncomfortable or embarrassed in exercise clothes.	1	2	3	4	5
7. I would feel more comfortable with my body if I exercised regularly.	1	2	3	4	5
8. There is too much I would have to learn to exercise.	1	2	3	4	5
9. Regular exercise would help me have a more positive outlook on life.	1	2	3	4	5
10. My exercising puts an extra burden on my significant other.	1	2	3	4	5

**Please complete the information on page 2 of this survey
to receive your \$10.00 check.**

Thank you for your help on this survey.

Appendix B

Motivational Interview Protocol

Motivational Interviewing Protocol

Rule of thumb— One question for every three reflections

+reflective listening

+key in on the struggles and demonstrate empathy

+notice personal, social and environmental factors of the limitation

+listen for personal responsibility and behaviors that have been used in the past

Hello, my name is _____, and I'm calling from the New Directions program. May I speak with _____ please? Hi _____. I sent you a post-card last week indicating that I would be calling. I am working with the New Directions program to contact people who have some kind of injury and or illness that limits what they do every day. The survey you completed indicates that you do have a medical condition/injury/illness. We greatly appreciate the time you spent completing the survey and because you expressed interest in our program by doing the survey and returning the postcard, I'd like to tell you about another opportunity to join us in the work we're doing at New Directions.

I want you to know that the costs of the research program I'll be telling you about are covered by a grant...*(expand if desired...For the first 6 months the exercise is free and following that time period the exercise is billed based on a sliding fee schedule ranging from \$5-\$25 depending on your income).*

In order to understand how New Directions might be useful for you, I wonder if you would mind telling me a little bit about your current medical condition? What has that been like for you dealing with (condition)?

Elicit the Story: If willing to tell story then the following questions will guide the process.

How has (your condition) limited the things you would like to do?

How did you spend your time before (the condition)?

What other kinds of things did you enjoy doing before (the condition)?

Do you have any on-going pain, is that a part of this? What is that like?

What is your energy level like...Do you get tired easily?

Have you ever done any exercise/physical therapy? What was that like? Helpful?

Were you ever in really good shape (including childhood)? How did you feel then?

After getting the story then go onto the following...

If unwilling to give story then start asking the following to assess the stage they are in, etc.

Get at importance/confidence/stages:

Are you currently involved in an exercise program? Tell me about it. *(Listen for the following info and if not obtained then ask questions about regularity and how long to determine stage according to grant proposal...)*

Precont—do not exercise now and do not intend to in the next 6 months

Cont—do not exercise now but intend to in next 6 months

Preparation—do exercise now but not regularly

Action—do exercise regularly now but not regularly for past 6 months

Maintenance—do exercise regularly now and have regularly for past 6 months

What has your experience of exercising been like? (*look for opportunities to build/support optimism in what they are currently doing and talk about ways the exercise has impacted their life...look for positives and build on these*)

On a scale of 1 to 10 with 1 being not important at all and 10 being extremely important, how would you rate the importance of getting some regular exercise? *Explore reasons for importance rating? If low, what would it take to increase the rating? Explore ideas. How did get to certain score if other than 1...So you are at a (). What increased your importance rating to a () (build/support optimism).*

On a scale of 1 to 10 with 1 being not confident at all, and 10 being extremely confident, how would you rate your confidence about beginning (or continuing) an exercise program? *Explore reasons for confidence rating? If low, what would increase your confidence? Build confidence looking at past successes, strengths, strategies they choose. How did get to certain score if not at a 1 (build/support optimism)?*

Higher ratings on both scales = more readiness.

[*If pain and/or fatigue were mentioned during conversation/story, then...*] Lots of folks have problems with pain and/or fatigue. Many of things we do at New Directions can help *hesitate*. For example, we have people who were not able to walk more than a block or clean their house before coming to New Directions who do those things and many more things they like to do today (*also add these success stories when promoting program*).

[*I'm in pain all the time so I can't do any exercise*] *Ask permission to offer information and then educate about deconditioning and chronic pain if patient agrees to accept info. Ask permission to offer info about the program (see below)... For people that have pain when they are active, we have some real good ideas to help manage pain even when they are beginning to exercise. Most people don't have more pain when they start exercising because people are encouraged to not overdo it or push themselves to the point where they have a lot of pain after exercising (Can Do).*

[*My Dr. told me not to exercise*] I can see where what I'm telling you might be confusing then. Some doctors are not aware of the most recent ideas about what things are good because things are always changing. Would it be o.k. if I share some information with you? (*talk about the prog if client is willing and importance of exercise, etc.*)...Some other people who have conditions like what you are describing find that the exercising they have done at New Directions has been really useful for them.

[*I'm already doing lots of exercise/keeping active*] That is wonderful. It sounds like you have found great ways to stay in shape. Is it o.k. for me to share with you how New Directions can add to what you are already doing/what you did before? (*provide following info*)

[*Information to give about the program*] Some other people who have conditions like what you are describing find that the exercising they have done at New Directions has been really useful for them. With that in mind, is it o.k. for me to share with you some information about New Directions? We offer a program that is specifically designed to fit your needs and to help out with your condition. We have a personal trainer and physical therapists that help

people in the gym and all of our staff members are skilled at helping people with (disabilities/functional limitations/health problems). (*talk further about comforts of gym, atmosphere, sociability, successes of others*)

[*I'm not interested*] (*Refer to sheet regarding handling resistance and if those ideas don't move the person then say...*) O.k. Sometimes when we reach people, it just not the right time for them to think about these kinds of things. Can I call you again in a couple of weeks (*if still resistant then suggest calling in 2-3 months*) to see how things are going? Thank you for your time today and for answering the survey questions, which we will keep sending to you if that is O.K.

Can Do (add where appropriate throughout stages)

We've found that people gain a lot from not doing very much. Most people start very slowly and gradually work up to more exercise time.

A lot of the people we work with find that after they have gotten used to exercising, they hate to miss a day. But that takes a little while to get to that point.

For people that have pain when they are active, we have some real good ideas to help manage pain even when they are beginning to exercise. Most people don't have more pain when they start exercising.

We also find that many people start the exercise at one time and then don't come back for one reason or another. These same people often come back later and do some more. That seems to be a part of the process of learning to use exercise.

Stage Specific Protocol

PRECONTEMPLATION (Build motivation for change)

(Client has no intention of changing or taking action within the foreseeable future...not thinking about changing and may not see their behavior as a problem when asked).

ID problem...*(this has been done in opening)* (*Listen for ways that the condition interferes with daily activity, life in general*). *If inactive...* How has being out of shape affected your life? What are the not so good things? What do you like about not pushing yourself physically? What are the problems with not exercising/staying active? What would be good things about getting in shape/exercising—ask for examples? *Raise pros and acknowledge cons of changing/raise awareness of problems and risks of inactive lifestyle.*

Creating the gap questions:

If you (were stronger, had more energy, had less pain), what kinds of things would you want to do?

What would happen if you started working out or exercising regularly?

How does your physical strength affect the things you can do?

Have you found that when you are active you have more pain? [Insert ideas about de-conditioning]

Transportation problems often have a conditioning/strength component. “So, it’s gotten pretty tough to walk the two blocks for the bus. Seems like that has limited you quite a bit.” If you were able to walk more, then what kinds of things would you like to do?

CONTEMPLATION (Build motivation for change)

(Client is aware of problem and seriously considers action but has not yet made a commitment to change/act)

Listen for reasons of concern and tip balance in favor of change—evoke reasons to change and risks of not changing

What do you like about not pushing yourself physically? What are the problems with not exercising? What would be some good things about starting an exercise program/bad things? What is your experience with exercising? *(If have had some successes...* You were able to do some exercising in the past and do well with that...How was that for you? What helped you keep with the exercising at that time? How did you do it? What would it take to get you to that point of being able to exercise regularly again?

Creating the gap questions:

What would happen if you started working out or exercising regularly?

Is your physical strength related to the things you can do?

Have you found that when you are active you have more pain? [Insert ideas about de-conditioning]

Transportation problems often have a conditioning/strength component. “So, it’s gotten pretty tough to walk the two blocks for the bus. Seems like that has limited

you quite a bit.” If you were able to walk more, then what kinds of things would you like to do?

Clarify Goals: (start with goals client is most eager about; evaluate consequences of goal and steps to achieve; consider how client might go about achieving the goal; work until the client doesn't have serious doubts; menu of goals and choices) If you (were stronger, had more energy, had less pain), what kinds of things would you want to do? What are some things you would like to be able to do that you are unable to do? How does being out of shape fit into/affect those plans? What things are most important in your life? How do you want things to change? How would you like things to be different? what can you think of that might go wrong with that goal; what might be good about reaching this goal, what wouldn't be good; prep for relapse; explore based on ways behavior is inconsistent with or undermines important goals; hierarchy of goals; how does problem behavior fit into picture

Explore Options: You've thought about making some changes, what kinds of things have you considered? Affirm and support...offer info about program after asking permission from client.

Elicit Change Statements: (see ideas on separate sheets regarding eliciting self-motivating statements) What would happen if you continue being out of shape/a life without exercise? What concerns you about not exercising (as much as you would like)? What have you noticed over the years as you've been out of shape/haven't exercised much? What concerns you about not exercise? How do you feel about not doing exercise?

Concerns and Barriers: If have tried to exercise before...What problems did you have when you tried to exercise in the past? Any things you were able to do to decrease those problems...Tell me about that. What concerns you about making such changes? What can you do to decrease some of those concerns? What things do you think would make it hard to get into New Directions to do some exercising? (Explore problems and problem solve with the person)

Transportation Barriers: transportation can be a problem for many people. I'm wondering how you get around to do other things you need to do? (ask permission to tell about medicab, bus, and see if friends can help out)

PREPARATION (Help determine the best course of action)

(Client is intent upon taking action soon often reports steps in that direction; if not initial steps have been taken towards change, most clients will make serious attempt at change soon [within a month perhaps]).

Determine Level of Ambivalence...client is still weighing pros and cons...be supportive and empathic during this process. Creating the Gap questions may be useful here.

Creating the gap questions:

If you (were stronger, had more energy, had less pain), what kinds of things would you want to do?

What would happen if you started working out or exercising regularly?

How does your physical strength affect the things you can do?

Have you found that when you are active you have more pain? [Insert ideas about de-conditioning]

Transportation problems often have a conditioning/strength component. "So, it's gotten pretty tough to walk the two blocks for the bus. Seems like that has limited you quite a bit." If you were able to walk more, then what kinds of things would you like to do?

Reinforce commitment but be realistic regarding person's skills (if overly enthusiastic, explore this with them in a supportive manner)...Change can be a difficult thing to adjust to... Sometimes when people first start doing some thing new they end up doing too much in the beginning. This may not concern you but it sounds like you are planning a lot of things to get this going. How will you know if you are overdoing it?

Elicit Change Statements: (see ideas on separate sheets regarding eliciting self-motivating statements) What would happen if you continue being out of shape/a life without exercise? What concerns you about not exercising (as much as you would like)? What have you noticed over the years as you've been out of shape/haven't exercised much? What concerns you about not exercise? How do you feel about not doing exercise?

Ask key questions to build action plan: asked when client is at peak of problem awareness—asked immediately after recapitulation; meet client's answer with reflection, emphasize personal responsibility, freedom and choice How can you turn those thoughts into actions? What can you do now? Where can you go from here? What (if anything) have you done to start preparing for joining an exercise program? How are you feeling about these steps? What do you think you will do? What's the next step? What are your options? Which problems you've mentioned are the most important reasons for adding exercise to your life? How are you going to do it? Would it be o.k. for me to share with you how I feel about your plans/some problems I see with your plan? This may not concern you, but... How would your life be different if you followed this idea?

Assess Commitment: How committed are you to take the steps we've talked about (you've been planning) on a scale from 1 to 10 where 1 means you are not at all committed and 10 means you are extremely committed. *If not ready to make a commitment then do not press; it is better to roll with this process...if you're not ready yet, then I don't want you to make a commitment, this is too important to decide now, think about it for a little while and we'll talk about it more when I call next; Is this what you would like to do?*

Including Others...have client visit, write, or telephone others to let them know about the decision—make it public and ask for help; ask to share plan with others in clinic Often people find that it is helpful to make plans public by telling people what you are planning. How would you feel about involving others/Who are some people you might feel comfortable sharing your plan with? How can others help and support you as you make these changes?

*Evaluating Plan...*How will you know that your exercise plan is working/not working? How do you think this plan would work?

Barriers and Solutions... What will the first week of exercising be like? What things may get in the way of exercising? What can you do to decrease these problems? *If have tried to exercise before...* What problems did you have when you tried to exercise in the past? Any things you were able to do to decrease those problems... Tell me about that. What concerns you about making such changes? What can you do to decrease some of those concerns? What things do you think would make it hard to get into New Directions to do some exercising?
(*Explore problems and problem solve with the person*)

Transportation Barriers: transportation can be a problem for many people. I'm wondering how you get around to do other things you need to do? (*ask permission to tell about medicab, bus, and see if friends can help out*)

ACTION (Help client as take action)

(Client is aware of problem and actively modifies behavior, experiences, and environment in order to overcome problem. Commitment is clear and effort is great toward making changes). *Remember that ambivalence and strengthening commitment are still issues; don't order client to do certain plan, don't provide too little direction*

Reevaluate the Plan... What things have been working with your exercise program? What things have not been working so well? How do you handle things when they don't work so well? *Explore rough spots. (Problem solve with client if they have not learned to handle little slips)*

Explore pros and cons with the client... What are the good things about exercising/the changes you have made? What have been the not so good things? *Rephrase Creating the Gap questions.*

As you've been exercising, what kinds of things have you been able to do that you weren't able to do before exercising?

What have you noticed as you started working out or exercising regularly?

How has your physical strength affected the things you can do?

How has the exercising affected your pain?

Transportation problems often have a conditioning/strength component. Before you started exercising was it pretty tough to walk to places you needed to go such as the bus stop? Seems like that limited you quite a bit. Now that you are able to walk more, what kinds of things do you like to do?

Evaluate Confidence... On a scale of 1 to 10 with 1 being not confident at all, and 10 being extremely confident, how would you rate your confidence about continuing an exercise program? (*may have been asked in beginning already*). *Explore reasons for confidence rating? If low, what would increase your confidence? Build confidence looking at past successes, strengths, strategies they choose. How did get to certain score if not at a 1 (build/support optimism)?*

Reaffirm Commitment... How committed are you to continue your exercise routine on a scale from 1 to 10 where 1 means you are not at all committed and 10 means you are extremely committed. *If not ready to make a commitment then do not press; it is better to roll with this process...if you're not ready yet, then I don't want you to make a commitment, this is too*

important to decide now, think about it for a little while and we'll talk about it more when I call next; *explore reluctance*; Is this what you want to do?

Make intrinsic attributions for success... What qualities do you see in yourself that helped you keep up an exercise routine? What qualities do you think others see in you?

MAINTENANCE (Help client identify and use strategies to prevent relapse)

(Client has made a sustained change wherein a new pattern of behavior has replaced the old. New behavior is firmly established and relapse is less likely. Relapse may occur after an initial slip has occurred).

*Review plan and relapse prevention ideas if maintaining behaviors well... How will you know if your plan isn't working anymore? Sounds like you've been doing a lot to keep up with the exercising. It is normal for some things to get in the way of exercising. Have you experienced any problems yet? Tell me more about those. How were you able to handle those setbacks? Have you involved others in your plans? (*problem solve this idea if hasn't already been part of their plan*)*

*When in relapse then explore factors precipitating and maintaining relapse crisis... Although frustrating to deal with, setbacks are completely normal and happen to a lot of people when they are trying to make changes (adopt a new lifestyle). *Provide empathy and explore what went wrong.* What happened to lead you to decreasing/stopping your exercise program? How are you feeling about that? How are you feeling about starting again (confidence/importance ratings)? What can you do to get back into a program again? What have you learned about keeping exercise going? What seemed(s) to interfere with exercising? What can you do/did you do to decrease those barriers?*

*Emphasize Success... You were exercising for awhile, how did you keep it up? Sounds like you had a lot of things interfering with your exercise program, how did you keep it up for the amount of time you did? Sounds like you did a lot to keep it up. Is it o.k. for me to share with you how New Directions can add to what you are already doing/what you did before? *Affirm successes and goals and ways they knocked down barriers.**

Additional Ideas and Self-Motivating Statements

Support Self-Efficacy— If you wish I will help you to change yourself

Open Questions—Tell me what's been happening; what led you to decide to allow me to call you about our program; what do you like about your current lifestyle, what don't you like; what would you like to be able to do if you could get back into a more active lifestyle";

Affirm— "I appreciate how hard it must have been for you; that's a good suggestion; you seem to be resourceful to be able to live with a problem for so long and not fall apart; this must be very difficult for you; You've done a remarkable job; I appreciate how strong you've had to be; I appreciate your efforts

Eliciting Self-Motivating Statements—(use following ideas at appropriate points within the protocols)

Evocative Questions—What things make you think that not exercising/being out of shape is a problem; what difficulties have you had while being out of shape; In what ways has it been a problem to be out of shape; what worries you and others; how do you feel nowadays; what do you think will happen if you don't start getting in shape; the fact that you let me call you indicates that at least a part of you thinks it's time to do something; what are the reasons you see for making a lifestyle change that includes exercise; what are disadvantages and concerns; inconveniences; what advantages would there be to adding exercise to your life; There are probably some real specific things that bother you about being out of shape; what success have you had that makes you feel like you could start exercising/increase your exercise; what qualities do you think other people see in you; what encourages you that you can add exercise to your life if you want to; what strengths do you think you have to help you through the changing process

Decisional Balance— “You've told me some things you like about not pushing yourself, what are some of the things you don't like; give me an example; what are the not so good things

Elaboration—ask for ex...; how much and in what way behavior is of concern; details about behavior and mood changes, typical day, when you were exercising how was your mood; when was the last time you felt like that; tell me more about that; such as...;

Using Extremes—imagine worst consequences; what concerns you the most; what are your worst fears about what might happen if you don't get in shape; what is the worst thing you can imagine; what would the worst/best thing be about exercising (or not exercising)

Looking Back—remember times before problem emerged and compare to present situation; do you remember a time when things were going better for you, what has changed; what were things like before when you were exercising; what are the differences between Pat of 10 years ago and Pat now; how has being out of shape stopped you from moving forward toward your goals; contrast present situation with past—*assuming there were good days*; “before () what was your life like; when was the last time things were going well for you and what was your life like then”. What made your life good then?

Looking Forward—how it might be after a change; what are your hopes for the future; look forward to 5 years and tell me where you'd like to be; how does being out of shape fit into those hopes, plans; what would it take for you to decide to start exercising (more); what would have to happen; so if those things happened that would turn you around; suppose things don't change and you continue a life without exercise/much exercise where would you be in 5 years; what are your hopes for the future; how would you like things to turn out for you; what could you do in the future to add exercise to your life; what would be the best results you can imagine if you started exercising

Paradox—you haven't convinced me yet that you have a real problem; I'm not convinced you are motivated enough; "I'm going to be you and your job is to persuade me that there really is a problem here that I need to examine and do something about

Appendix C

Computer Assisted Healthcare Resource Utilization System (CAHRUS) Questions

Health Care Utilization Screen

Doctor's Appointments

In the last month have you had a doctor's appointment?

- No
 Yes

If yes, how many times have you visited a doctor in the last month? _____

Were any of the following test performed during these doctor visits?

- a. Blood tests
 No
 Yes

If yes, how many times were blood tests performed at these doctor visits? _____

- b. Other tests (urine, blood stool, pap smear, etc.)
 No
 Yes

If yes, how many times were each of the following tests performed at these doctor visits?

- Urine tests
 Blood stool tests
 Pap smear test
 Other tests (Please specify: _____)

- c. EKG
 No
 Yes

If yes, how many EKG's were performed during these doctor visits? _____

- d. X-rays
 No
 Yes

If yes, how many X-rays have were performed during these doctor visits? _____

- e. Mammogram
 No
 Yes

If yes, how many mammograms were performed during these doctor visits? _____

- f. MRI
 No
 Yes

If yes, how many MRIs were performed during these doctor visits? _____

Extended Hour/Walk-in Clinic Visits (i.e. Now Care or First Care)

In the last month have you visited an extended hour or walk-in clinic?

- No
 Yes

If yes, how many times have you visited an extended hour clinic in the last month?

Were any of the following tests performed during these extended hour clinic visits?

- a. Blood tests
 No
 Yes

If yes, how many times were blood tests performed at extended hour visits? _____

- b. Other tests (urine, blood stool, pap smear, etc.)
 No
 Yes

If yes, how many times were each of the following tests performed at extended hour clinics?

- Urine tests
 Blood stool tests
 Pap smear test
 Other tests (Please specify: _____)

- c. X-rays
 No
 Yes

If yes, how many times were X-rays performed during these extended hour clinic visits? _____

Emergency Room Visits

In the last month have you visited the emergency room?

- No
 Yes

If yes, how many times have you had an emergency room visit in the last month?

Were any of the following tests performed during these emergency room visits?

- a. Blood tests
 No
 Yes

If yes, how many times were blood tests performed during emergency room visits?

- b. Other tests (urine, blood stool, pap smear, etc.)

- No
 Yes

If yes, how many times were each of the following tests performed during emergency room visits?

- Urine tests
 Blood stool tests
 Pap smear test
 Other tests (Please specify: _____)

- c. EKG
 No
 Yes

If yes, how many EKG's were performed during these emergency room visits? _____

- d. X-rays
 No

Yes

If yes, how many X-rays have were performed during these emergency room visits?

f. MRI

No

Yes

If yes, how many MRIs were performed during these emergency room visits?

Outpatient Surgery Procedures

Have you had an outpatient surgery procedure in the last month?

No

Yes

If yes, how many outpatient surgeries have you had in the last month?

For each outpatient surgery, which anesthesia option was administered?

(Indicate with one check mark (√) per outpatient surgery)

General Anesthesia (you were unconscious)

Epidural or spine related anesthesia

Local anesthesia (related to specific area of the body, but not an epidural)

No anesthesia

Hospital Visits

During the last month, how many nights did you stay in the hospital? nights

Other Tests

During the last month, did you have any tests that were not performed as part of a doctors, extended hour, emergency, outpatient surgery, or hospital visit? (such as weekly blood tests to monitor blood thinning medications)

a. Blood tests

No

Yes

If yes, how many times were blood tests performed?

b. Other tests (urine, blood stool, pap smear, etc.)

No

Yes

If yes, how many times were each of the following tests performed?

- _____ Urine tests
- _____ Blood stool tests
- _____ Pap smear test
- _____ Other tests (Please specify: _____)

Personal Costs to Attend Medical Appointments

Excluding hospital visits

During the last month, how many hours did you spend to attend these doctors, extended hour, emergency room, outpatient surgery or other test appointments (this includes travel to and from the appointment, time waiting, and time with a practitioner?)

_____ Number of hours

Excluding hospital visits

How many hours was a personal assistant or other care-giver required for you to attend these doctor, extended hour, emergency room, outpatient surgery, or other test appointments (i.e. for transportation, childcare, personal assistance, etc.)?

_____ Number of hours

Other Therapies and Service Appointments

How many times did you attend Occupational Therapy (OT) appointments in the last month?

_____ Number of times

How many times did you attend Physical Therapy (PT) appointments in the last month?

_____ Number of times

How many times did you attend Counseling appointments in the last month?

_____ Number of times

How many times (or days) did you have skilled nursing services in the last month?

_____ Number of times

How many times did you attend an Alternative Medicine appointment (such as acupuncture or massage) in the last month?

_____ Number of times

For all therapy and service appointments listed

How many total hours did you spend to attend these appointments (this includes travel to and from the appointment, time waiting, and time with a practitioner)?

_____ Number of hours

For all therapy and service appointments listed

How many total hours was a personal assistant or other care-giver required for you to attend these therapy or service appointments (i.e. for transportation, childcare, personal assistance, etc.)?

_____ Number of hours



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