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Telephone-Based Intervention to Improve Rehabilitation Engagement After Spinal Stenosis Surgery:

A Prospective Lagged Controlled Trial

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Abstract

Background: Spine surgery outcomes are variable. Patients who participate in and take responsibility for their recovery have improved health outcomes. Interventions to increase patient involvement in their care may improve health outcomes after a surgical procedure. We conducted a prospective interventional trial to compare the effectiveness of health behavior change counseling with usual care to improve health outcomes after lumbar spine surgical procedures.

Methods: In this study, 122 patients with lumbar spinal stenosis undergoing a decompression surgical procedure from December 2009 through August 2012 were enrolled. Participants were assigned, according to enrollment date, to health behavior change counseling or usual care. Health behavior change counseling is a brief, telephone-based intervention intended to increase rehabilitation engagement through motivational interviewing strategies that elicit and strengthen motivation for change. Health behavior change counseling was designed to identify patients with low patient activation, to maximize postoperative rehabilitation engagement, to decrease pain and disability, and to improve functional recovery. Participants were assessed before the surgical procedure and for 3 years after the surgical procedure for pain intensity (Brief Pain Inventory), disability (Oswestry Disability Index), and physical health (12-Item Short-Form Health Survey, version 2). Differences in changes in health outcomes after the surgical procedure were compared between the health behavior change counseling group and the usual care group.

Results: By 12 months, health behavior change counseling participants reported significantly greater reductions in pain intensity ($p = 0.008$) and disability ($p = 0.028$) and significantly greater improvement in physical health compared with usual care participants ($p = 0.025$). These differences were attenuated by 24 and 36 months after the surgical procedure. Early improvements in health outcomes were mediated by improvements in physical therapist-rated engagement and

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Disclosure:

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self-reported attendance at physical therapy sessions in the health behavior change counseling group.

Conclusions: Health behavior change counseling improved health outcomes during the first 12 months after the surgical procedure through changes in rehabilitation engagement. Wider use of health behavior change counseling may lead to improved outcomes not only after lumbar spine surgery but also in other conditions for which rehabilitation is key to recovery.

Level of Evidence: Therapeutic Level II. See Instructions for Authors for a complete description of levels of evidence.

Health-care reforms such as the Patient Protection and Affordable Care Act have shifted reimbursement to a value-based model rewarding evidence-based practices and patients' perceptions of quality of services¹. Value is the ratio of changes in patient outcomes to total cost of health-care services rendered². As the leading cause of disability in high-income countries³, lumbar spinal stenosis represents a burden greater than all other musculoskeletal conditions combined⁴. Therefore, lumbar spinal stenosis treatments are a likely candidate for value assessment. Rates and expenditures for lumbar spinal stenosis surgical procedures have risen dramatically during the past 20 years^{5,6}. Per-patient spine surgery costs are similar to those associated with diabetes and cardiovascular disease care⁷. In 2012, Medicare spending for spine surgery was \$3.9 billion⁸. Although a surgical procedure is indicated for patients with neurogenic claudication^{9–11}, health outcomes are highly variable. Nearly 40% of patients report persistent pain, disability, and poor quality of life, and approximately 20% of patients undergo reoperation^{12–15}. Increasing use, high costs, and variable outcomes raise concerns about value.

Variability in health outcomes after spine surgery may be related to differences in patient activation¹⁶, that is, patients participating in, and taking responsibility for, their health and recovery^{17,18}. Differences in patient activation have been associated with differences in health behavior^{19–21} and outcomes^{22,23}. Compared with patients with low patient activation, patients with high patient activation report greater postoperative rehabilitation engagement²⁴ and improvements in pain, disability, and physical health 2 years after the surgical procedure¹⁶. An intervention to improve rehabilitation engagement through increased patient activation showed substantial improvement in self-reported attendance and therapist-reported engagement in postoperative physical therapy²⁵.

Health behavior change counseling, a brief, telephone-based intervention²⁶, uses principles of motivational interviewing, a collaborative, person-centered form of guidance, to elicit and strengthen motivation for change^{27,28}. Health behavior change counseling was designed to maximize rehabilitation engagement, to decrease pain and disability, and to improve functional recovery in patients after a surgical procedure for lumbar spinal stenosis. In similar patients, clinically important reductions in pain and disability were related to increased patient satisfaction²⁹.

Our study extends earlier findings²⁶ to compare the effectiveness of health behavior change counseling with usual care for improving health outcomes after a lumbar spinal stenosis surgical procedure. We hypothesized that health behavior change counseling participants

would report greater reductions in pain and disability compared with those receiving usual care. We expected these reductions to lead to greater improvement in physical health in health behavior change counseling participants. Improvements in postoperative health outcomes would be mediated by an increase in rehabilitation engagement among those receiving health behavior change counseling (Fig. 1).

Materials and Methods

This study was approved by our institutional review board. All research-related events occurred in a private research room or via telephone to ensure confidentiality. All participants provided written informed consent.

Study Design

We conducted a lagged controlled trial to compare the effectiveness of health behavior change counseling compared with usual care for patients undergoing lumbar spinal stenosis surgical procedures²⁶.

The study was conducted at 1 academic spine center with 6 treating surgeons (4 orthopaedic surgeons and 2 neurosurgeons) at community-based hospitals.

Participants

We enrolled consecutive patients with lumbar spinal stenosis presenting to our academic spine center from December 2009 through August 2012 for lumbar decompression. Patients with lumbar spondylolisthesis or scoliosis also underwent arthrodesis. Patients were 18 years of age, were English-speaking, and were able to provide informed consent. Patients who had undergone a previous lumbar spine surgical procedure were excluded³⁰.

During enrollment, 185 patients presented for the surgical procedure. Of these, 139 patients (75%) were eligible. Common exclusions were previous lumbar spine surgical procedures (38 patients) and being non-English-speaking (9 patients). Of those eligible, 14 (10%) declined enrollment and 125 (90%) provided consent. Sixty patients were assigned usual care and 65 patients were assigned health behavior change counseling. One participant in the health behavior change counseling group did not receive all 3 telephone calls and withdrew from the study. Two participants were lost to follow-up (1 usual care, 1 health behavior change counseling), and 1 patient withdrew from the study. All remaining participants were followed for 3 years after the surgical procedure. A flowchart is provided as a modified Consolidated Standards of Reporting Trials (CONSORT) diagram (Fig. 2)³¹. Enrolled participants were similar to other published patient cohorts^{32,33}. Sociodemographic and clinical characteristics of this population have been described (Table I)^{25,26}. Participants were predominantly older (with a mean age [and standard deviation] of 59 ± 13.5 years), female (63%), and married or living with a spouse or partner (71%). Participants were likely to report being non-Hispanic (95%) or white (77%). Of the 122 patients who underwent a lumbar spine surgical procedure, 40 (33%) also had spondylolisthesis, and 24 (20%) also had scoliosis. There were no differences in sociodemographic or clinical characteristics between the usual care and health behavior change counseling groups.

Study Comparators

Comparator groups were usual care and health behavior change counseling. Usual care involved routine clinical management of signs and symptoms of lumbar spinal stenosis. This consisted of preoperative evaluation with physical examination and imaging, decompression surgery with or without arthrodesis, postoperative rehabilitation with clinic-based and home-based physical therapy, and postoperative assessment with physical examination and imaging. All participants in the usual care group received 3 scheduled telephone calls to account for the attention received by the health behavior change counseling group. During these calls, the study therapist asked participants about their progress. Medical questions were directed to the treating surgeon.

Health behavior change counseling included all elements of usual care. Participants in the health behavior change counseling group received 3 similarly timed telephone calls. During the preoperative call, the study therapist used motivational interviewing strategies to increase the patient's perception of the importance of physical therapy to recovery and confidence to follow through with rehabilitation. The therapist identified barriers to engagement and facilitated commitment to behavior change. Medical questions were directed to the treating surgeon. A detailed description of the health behavior change counseling protocol has been published²⁶.

Treatment Assignment

Group assignments were made according to enrollment date. Patients in the first wave (December 2009 through March 2011) were assigned to usual care. After 60 participants were enrolled and underwent the surgical procedure, our study therapist was trained in motivational interviewing²⁶. Patients in the second wave (May 2011 through August 2012) were assigned to health behavior change counseling. This study design minimized contamination in clinician-participant interaction if clinicians became aware of elements of the health behavior change counseling intervention.

Variables

Preoperative Assessment—All participants were enrolled before the surgical procedure, when patients were evaluated. Patients are the best source of information on how a disease or treatment affects their ability to resume normal lives³⁴. Patient activation was assessed using the Patient Activation Measure, a 13-item instrument used to stratify patients into 1 of 4 stages of patient activation: (1) patients are overwhelmed and are unprepared to take an active role in health; (2) patients lack knowledge and confidence for self-management; (3) patients are beginning to take action, but lack confidence and skill to support health behaviors; or (4) patients have adopted many of the behaviors to support their health but may not be able to maintain them under stress¹⁷. Sociodemographic characteristics (age, sex, race or ethnicity, education, and household income) and clinical characteristics (presence of lumbar spondylolisthesis or scoliosis and duration of symptoms) were collected. Patient-reported outcomes were pain intensity, disability, and health status.

Pain intensity was assessed using the Brief Pain Inventory³⁵, an 11-point scale for patients to rate pain (0 indicating no pain and 10 indicating the worst pain imaginable). The Brief Pain Inventory is a reliable and valid measure of pain in this population³⁶.

Disability was assessed using the Oswestry Disability Index³⁷, a disability percentage ranging from 0 (no disability) to 100 (complete disability) using a 10-item questionnaire. Patients rate how pain interferes with daily activities such as walking or climbing stairs. The Oswestry Disability Index is a valid assessment of disability that is sensitive to change in clinical status^{38,39}.

Health status was assessed using the Medical Outcomes Study 12-Item Short-Form Health Survey, version 2 (SF-12)⁴⁰. The SF-12 includes physical and emotional limitations on work and social activities and is based on population-derived norms to provide a health component t-score ranging from 0 (death) to 100 (perfect health), with a mean of 50 and a standard deviation of 10. The SF-12 has been shown to be a valid assessment of health and health change in many patient populations⁴¹. The physical component score of the SF-12 was used for our study.

Postoperative Assessments—Pain, disability, and health status were assessed at 3, 6, 12, 24, and 36 months after the surgical procedure.

Statistical Analysis

The primary analysis was an intent-to-treat analysis of between-group comparisons of changes over time in pain, disability, and health status. Missing observations caused by dropout and reasons unrelated to treatment were handled by using multiple imputation methods^{42,43}. Statistical tests were 2-sided with a level of significance of $p < 0.05$. SAS, version 9.3, software (SAS Institute) and Stata, version 14, software (StataCorp) were used.

Sample Size and Power—A priori power calculations were made using data from an observational cohort showing relationships among patient activation, health behavior, and health outcomes¹⁶. We hypothesized that patients in the health behavior change counseling group would experience a clinically meaningful change in score for pain intensity of 2 Likert points⁴⁴. Assuming a type-1 error rate of 1.7%, a power of 80%, and a 10% loss (to follow-up, disenrollment, or failure to collect pain intensity measurements), it was necessary to enroll at least 51 patients per group. Similarly, it was necessary to enroll between 48 patients (Oswestry Disability Index) and 54 patients (SF-12v2) to detect clinically meaningful differences in change scores between the 2 groups.

Intervention Effects—To compare the effectiveness of health behavior change counseling with usual care at improving pain, disability, and physical health, we fit a longitudinal mixed-effects model for each outcome using an independent conditional covariance structure (SAS software, PROC MIXED with REPEATED statements)⁴⁵. Statistical tests for the effect of comparator group, time from the surgical procedure, and group by time interaction were performed. Each model contained a random intercept for participant to account for correlation among observations from the same patient. Statistical models for each outcome were adjusted by age, sex, education, and baseline measure (e.g., the model to estimate the

effect of health behavior change counseling on improvement in pain intensity contained preoperative pain score as a covariate). We explored possible nonlinear (i.e., cubic) effects of treatment over time.

Mediation Analysis

We hypothesized that the association between health behavior change counseling and health outcomes would be mediated partially by rehabilitation engagement, which would be influenced by health behavior change counseling. We tested only these associations and no other possible pathways. Our expectation was that participants who benefited from health behavior change counseling would become more engaged in rehabilitation (i.e., would attend more physical therapy sessions, require fewer prompts during sessions, and actively participate in exercises). Health outcomes were measured as a latent variable using pain, disability, and physical health. Rehabilitation engagement was measured using physical therapist-reported engagement using the Hopkins Rehabilitation Engagement Rating Scale⁴⁶ and self-reported attendance in physical therapy and home exercise⁴⁷. These measures have been used in lumbar spine surgery populations^{24–26}. The overall model fit was assessed with use of the Comparative Fit Index⁴⁷.

Results

Overall Postoperative Differences

After the surgical procedure, all participants experienced improvements in health outcomes (Table II). On the basis of a 36-month follow-up, there were no differences in rate of change per month for health behavior change counseling participants compared with usual care participants for pain (estimate, -0.01 [95% confidence interval (CI), -0.02 to 0.02]; $p = 0.862$), disability (estimate, 0.09 [95% CI, -0.05 to 0.23]; $p = 0.226$), or physical health (estimate, 0.02 [95% CI, -0.06 to 0.10]; $p = 0.628$).

Early Postoperative Differences

During the first year after the surgical procedure, the health behavior change counseling group experienced greater improvements (change per month) in pain (estimate, 20.10 [95% CI, 20.17 to 20.03]; $p = 0.008$) (Fig. 3-A), disability (estimate, 20.75 [95% CI, 21.43 to 20.08]; $p = 0.028$) (Fig. 3-B), and physical health (estimate, 0.36 [95% CI, 0.04 to 0.67]; $p = 0.025$) (Fig. 3-C) compared with the usual care group (Table II).

Late Postoperative Differences

Between 12 and 36 months after the surgical procedure, early differences observed between the groups were attenuated (Table II). There were no differences (change per month) in reduction of pain (estimate, 20.02 [95% CI, 20.05 to 0.01]; $p = 0.222$), disability (estimate, 20.17 [95% CI, 20.39 to 0.04]; $p = 0.117$), or improvement in physical health (estimate, 0.08 [95% CI, 0.02 to 0.17]; $p = 0.123$) after the surgical procedure.

Mediation Analysis

Measures of rehabilitation engagement had a mediating influence on the relationship between health behavior change counseling and health outcomes (Fig. 4 and Table III). Participation in health behavior change counseling led to improved health outcomes at 12 months after the surgical procedure (standardized regression weight range, 5.39 to 6.01 across models; $p < 0.01$ for all). Health behavior change counseling predicted higher physical therapist-rated engagement (standardized regression weight, 3.01; $p < 0.001$) and self-reported attendance in physical therapy (standardized regression weight, 0.13; $p < 0.001$) but not home exercise program (standardized regression weight, 0.05; $p = 0.292$). For engagement (Fig. 4-A), higher rehabilitation engagement predicted greater health outcomes improvement (standardized regression weight, 4.63; $p = 0.004$). For physical therapy attendance (Fig. 4-B), higher attendance predicted better health outcomes (standardized regression weight, 3.12; $p = 0.008$). There was no significant effect of home exercise program attendance (Fig. 4-C) on health outcomes.

There was good model fit (Comparative Fit Index, >0.900) (Table III).

Discussion

A brief, telephone-based intervention effectively improved patients' rehabilitation engagement after a lumbar spinal stenosis surgical procedure. Health behavior change counseling delivered preoperatively and during 2 postoperative "booster" sessions led to greater improvements in health outcomes within the first year compared with usual care. However, these early differences were attenuated between 24 and 36 months after the surgical procedure. The influence of health behavior change counseling was, in part, mediated by improvements in rehabilitation engagement and physical therapy attendance.

It was unsurprising that our intervention had maximum effect during the first year. Health behavior change counseling was designed to identify patients who are at risk for poor rehabilitation engagement²⁶. A study has shown the ability of health behavior change counseling to improve engagement in physical therapy and home exercise using subjective and objective measures of health behavior²⁵. Given that patients participated in postoperative rehabilitation during the first 6 months of their recovery, the intervention effect was expected to occur during this period. Our findings are consistent with those of published reports on the use of interventions based on motivational interviewing in other medical settings. In a randomized clinical trial, Rosenbek Minet et al.⁴⁸ demonstrated improved perceived competence in diabetes self-management among participants in the motivational interviewing group compared with controls. However, by 24 months, this difference had attenuated. In a review of 10 primary randomized clinical trials, Franek⁴⁹ reported that these types of interventions led to short-term improvements in health outcomes and that more research was needed to determine the long-term benefits. If our goal had been to improve long-term physical activity among these patients, additional booster sessions would be warranted.

Telephone-based interventions such as health behavior change counseling allow health-care providers to reach a broad population who are at risk for poor outcomes after spine surgery.

The ability to tailor interventions to these patients increases the efficiency with which the health-care system delivers costly interventions such as spine surgery.

The current study had limitations. First, we used a prospective lagged controlled design, allowing us to enroll the usual care group before training our research personnel in motivational interviewing. Thus, our study was free from potential contamination between groups. Without random assignment, however, we could not rule out unobserved confounding. An examination of sociodemographic and clinical characteristics suggests that our 2 groups were balanced. Second, this study was conducted at 1 academic medical center, thereby limiting the ability to generalize these findings. Patients at our center are treated by 1 of 4 orthopaedic surgeons or 2 neurosurgeons at 1 of 4 outpatient centers in 3 distinct urban and suburban regions. We believe that this variety in surgeon training, clinic type, and region provided some ability to generalize these findings to similar practices. Third, 1 trained interventionist delivered the attention control (usual care) and health behavior change counseling. Although this preserved internal validity, use of only 1 interventionist may limit the ability to generalize to the settings where this intervention would be delivered by health-care providers (e.g., physical therapists or specially trained call center personnel). Fourth, in any intervention trial, it is possible that multiple contacts with the interventionist may influence participant behavior. To control for this bias, we included an attention control component to usual care. Participants in both groups received the same frequency of telephone contact with the interventionist. The only difference was in the content of these calls. Fifth, multiple copayments may have imposed a financial constraint that limited the ability of patients to engage fully in physical therapy. This issue was noted by several patients in our study. Finally, we used multiple imputation techniques to estimate data on the basis of nonignorable missingness. Each outcome measure was missing <4% of data across all participants and time points. Disability had the highest amount of missing data (3.9%), primarily because of individual participants refusing to answer a question about sexual ability. For those patients, a compensatory scoring algorithm was used.

A strength of our study was the application of structural equation modeling as a formal mediation analysis to account for the relationships among health outcomes, rehabilitation engagement, and intervention. The results have important clinical implications. For patients at high risk for poor outcomes after spine surgery, surgeons and patients have limited tools to improve the likelihood of good health outcomes. Health behavior change counseling improved rehabilitation engagement and health outcomes in this at-risk population. Health behavior change counseling is an inexpensive and scalable way for surgeons to support patients after spine surgery. Wider use of health behavior change counseling may lead to improved outcomes not only for patients undergoing a lumbar spine surgical procedure but also for those with other conditions in which rehabilitation is important to recovery.

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Fig. 1. Conceptual framework demonstrating the relationships among patient activation, health behavior, and health outcomes. (Reproduced, with permission of Elsevier, from: Skolasky RL, Riley LH 3rd, Maggard AM, Bedi S, Wegener ST. Functional recovery in lumbar spine surgery: a controlled trial of health behavior change counseling to improve outcomes. *Contemp Clin Trials*. 2013 Sep;36(1):207–17. Epub 2013 Jun 29.

Fig 2.
Modified CONSORT flowchart.

Fig. 3-A

Fig. 3-B

Fig. 3-C

Fig. 3-A, 3-B, and 3-C.

Differences in patient-reported outcomes in pain. The X axis is in months of follow-up, and the error bars indicate the 95% CI. HBCC = health behavior change counseling. **Fig. 3-A** Pain intensity according to the Brief Pain Inventory. **Fig. 3-B** Disability according to the Oswestry Disability Index. **Fig. 3-C** Physical health according to the Medical Outcomes Study 12-Item Short-Form Health Survey between patients who received health behavior change counseling and those who received usual care after a lumbar spinal stenosis surgical procedure.

Fig. 4-A, 4-B, and 4-C.

Structural equation models of rehabilitation. HBCC = health behavior change counseling, HRERS = Hopkins Rehabilitation Engagement Rating Scale, HO = health outcomes, Phys Hlth = physical health component score of the Medical Outcomes Study Short Form-12, version 2, PT = self-reported attendance in physical therapy, and HEP = self-reported attendance in home exercise program. **Fig. 4-A** Rehabilitation engagement. **Fig. 4-B** Physical therapy attendance. **Fig. 4-C** Home exercise program attendance.

TABLE I

Characteristics of Study Participants Enrolled from December 2009 Through August 2012

Characteristic	Health Behavior Change Counseling		P Value*
	Usual Care (N = 59)	(N = 63)	
Age [†] (yr)	58 ± 13.5	60 ± 13	0.449
Female sex [‡]	39 (66)	38 (60)	0.508
Marital status [‡]			0.731
Married or living with spouse	44 (75)	43 (68)	
Separated, divorced, or widowed	10 (17)	14 (22)	
Living with partner	1 (2)	2 (3)	
Never married	4 (7)	4 (6)	
Race [‡]			0.328
White	45 (76)	49 (78)	
Black	13 (22)	10 (16)	
Other	1 (2)	4 (6)	
Ethnicity [‡]			0.111
Non-Hispanic	58 (98)	58 (92)	
Hispanic	1 (2)	5 (8)	
Household income [‡]			0.384
<\$30,000	9 (15)	10 (16)	
\$30,000 to \$50,000	7 (12)	6 (10)	
>\$50,000	40 (68)	38 (60)	
Not reported	3 (5)	9 (14)	
Education [‡]			0.141
Less than college	33 (56)	37 (59)	
College degree	8 (14)	15 (24)	
Postgraduate degree or study	18 (31)	11 (17)	
Patient activation [†]	43 ± 7.0	43 ± 5.1	0.961
Diagnosis [‡]			0.874
Lumbar stenosis	29 (49)	29 (46)	
Lumbar stenosis and spondylolisthesis	18 (31)	22 (35)	
Lumbar stenosis and lumbar deformity	12 (20)	12 (19)	

* Comparison between the usual care and health behavior change counseling groups.

[†] The values are given as the mean and the standard deviation.[‡] The values are given as the number of patients, with the percentage in parentheses.

TABLE II

Patient-Reported Outcomes by Study Group and Time Points

Assessment Time Point	Usual Care* (N = 59)			Health Behavior Change Counseling* (N = 63)		
	Brief Pain Inventory [†]	Oswestry Disability Index [‡]	SF-12 Physical Component Score [§]	Brief Pain Inventory [†]	Oswestry Disability Index [‡]	SF-12 Physical Component Score [§]
Preoperative	6.7 ± 2.5	60 ± 20	36 ± 7.7	6.4 ± 2.9	65 ± 17	36 ± 7.0
3 mo	5.1 ± 1.9	36 ± 17	41 ± 7.5	4.0 ± 1.2	28 ± 12	44 ± 8.1
6 mo	3.7 ± 2.1	36 ± 15	47 ± 7.5	2.8 ± 1.1	24 ± 15	49 ± 7.3
1 yr	4.0 ± 1.2	26 ± 17	48 ± 6.6	2.4 ± 0.7	19 ± 11	53 ± 9.0
2 yr	2.9 ± 0.9	25 ± 14	51 ± 6.0	2.6 ± 1.1	22 ± 11	52 ± 6.8
3 yr	3.5 ± 1.2	23 ± 11	48 ± 9.2	2.5 ± 0.8	23 ± 8.4	51 ± 7.5

* The values are given as the mean and the standard deviation, in points.

[†] A scale ranging from 0 to 10, in which 0 is no pain and 10 is the worst pain imaginable.

[‡] A scale ranging from 0 to 100, in which 0 is no disability and 100 is complete disability.

[§] A score ranging from 0 to 100, in which 0 is death and 100 is perfect health.

TABLE III

Standardized Regression Weights for Causal Pathways Included in the Structural Equation Model* (N = 122)

Model*	Standardized Regression Weight [†]	P Value	Comparative Fit Index
Model A: physical therapist-reported rehabilitation engagement			0.946
Hopkins Rehabilitation Engagement Rating Scale → health outcomes	4.63 ± 1.62	0.004	
Health behavior change counseling intervention → Hopkins Rehabilitation Engagement Rating Scale	3.01 ± 0.67	<0.001	
Health behavior change counseling intervention → health outcomes	5.95 ± 1.55	<0.001	
Model B: self-reported physical therapy attendance			0.913
Physical therapy attendance → health outcomes	3.12 ± 1.18	0.008	
Health behavior change counseling intervention → physical therapy attendance	0.13 ± 0.03	<0.001	
Health behavior change counseling intervention → health outcomes	6.01 ± 1.53	<0.001	
Model C: self-reported home exercise program attendance			0.901
Home exercise program attendance → health outcomes	3.17 ± 2.49	0.203	
Health behavior change counseling intervention → home exercise program attendance	0.05 ± 0.04	0.292	
Health behavior change counseling intervention → health outcomes	5.39 ± 1.43	<0.001	

* Arrows indicate the tested pathway on the structural equation model.

[†] The values are given as the parameter estimate and standard error.