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Predictors of Exercise Behavior in Patients With Rheumatoid Arthritis 6 Months Following a Visit With Their Rheumatologist

Background and Purpose. When factors that influence exercise behavior are known, health care professionals can more likely design and modify patient education materials targeted to promote exercise behavior. This study aimed to identify predictors of exercise behavior in patients with rheumatoid arthritis 6 months after a visit with their rheumatologist. **Subjects and Methods.** Twenty-five rheumatologists and 132 patients with rheumatoid arthritis participated. One hundred thirteen patients (85.6%) completed the 6-month follow-up. Rheumatologists and patients completed baseline questionnaires and were audiotaped during a subsequent visit. Physical function and exercise behavior were ascertained via questionnaire 6 months following the visit. Multivariate logistic regression identified predictors of exercise behavior at 6 months. Eighty-nine patients (79%) were female. The average age was 54.8 years (SD=14.4, range=20–94). The mean duration of illness was 9.8 years (SD=8.7, range=<1–35). Patients were moderately impaired (mean Medical Outcomes Study 36-Item Short-Form Health Survey [SF-36] function score=49.3, SD=27.5). Thirty-four patients (27%) were exercising 6 months after visiting their rheumatologist. More than 50% of the rheumatologists had 5 or more years of clinical experience, 18 (72%) were male, and 10 (42%) reported they exercised regularly. **Results.** Predictors of exercise behavior at 6 months were patients' past history of exercise (odds ratio=6.8, 95% confidence interval=3.1–15) and rheumatologists' current exercise behavior (odds ratio=0.26, 95% confidence interval=0.09–0.77). **Discussion and Conclusion.** Patients were nearly 7 times more likely to exercise 6 months after visiting their rheumatologist if they participated in exercise in the past. If a patient's rheumatologist was currently performing aerobic exercise, the patient was 26% more likely to be engaged in exercise at follow-up. These data may be useful in understanding patient motivation to participate in exercise. [Iversen MD, Fossel AH, Ayers K, et al. Predictors of exercise behavior in patients with rheumatoid arthritis 6 months following a visit with their rheumatologist. *Phys Ther.* 2004;84:706–716.]

Key Words: *Exercise behavior, Rheumatoid arthritis.*

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During the past decade, our knowledge of the importance of exercise as part of the management of musculoskeletal diseases such as arthritis, osteoarthritis (OA), and fibromyalgia has increased.¹ Studies¹⁻³ have shown that physical training programs are beneficial to patients with rheumatoid arthritis (RA). Increased muscle force and aerobic capacity, decreased inflammation and pain, and improved function are some of the benefits of rehabilitation for patients with RA.² In addition, regular exercise may influence emotional or social factors, sense of well-being, cognitive processing, and coping strategies.^{1,3}

The value of gaining insight into patient behaviors related to therapeutic approaches is well recognized.

When factors that influence behavior are known, health care professionals are more likely to take appropriate action to design and modify patient education materials targeted to promote exercise behavior. In our study, we wanted to identify factors that influence exercise behavior in patients with active stable RA. We examined the influences of predisposing factors for changes in exercise behavior, attitudes and beliefs about exercise, and discussions of exercise on exercise behavior 6 months following a baseline clinical encounter. Our intent was to provide data to identify avenues that could be used to promote healthy lifestyles in this patient population.

Prolonged inactivity is one of the most important factors contributing to impaired functioning and disability with

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Dr Iversen and Dr Daltroy provided concept/idea/research design, data collection and analysis, project management, fund procurement, subjects, and facilities/equipment. Dr Ayers, Dr Palmsten, Dr Wang, and Dr Iversen provided writing. Ms Fossel provided assistance with programming for data analysis.

Brigham & Women's Hospital's and Simmons College's Internal Review Board approved the study protocol.

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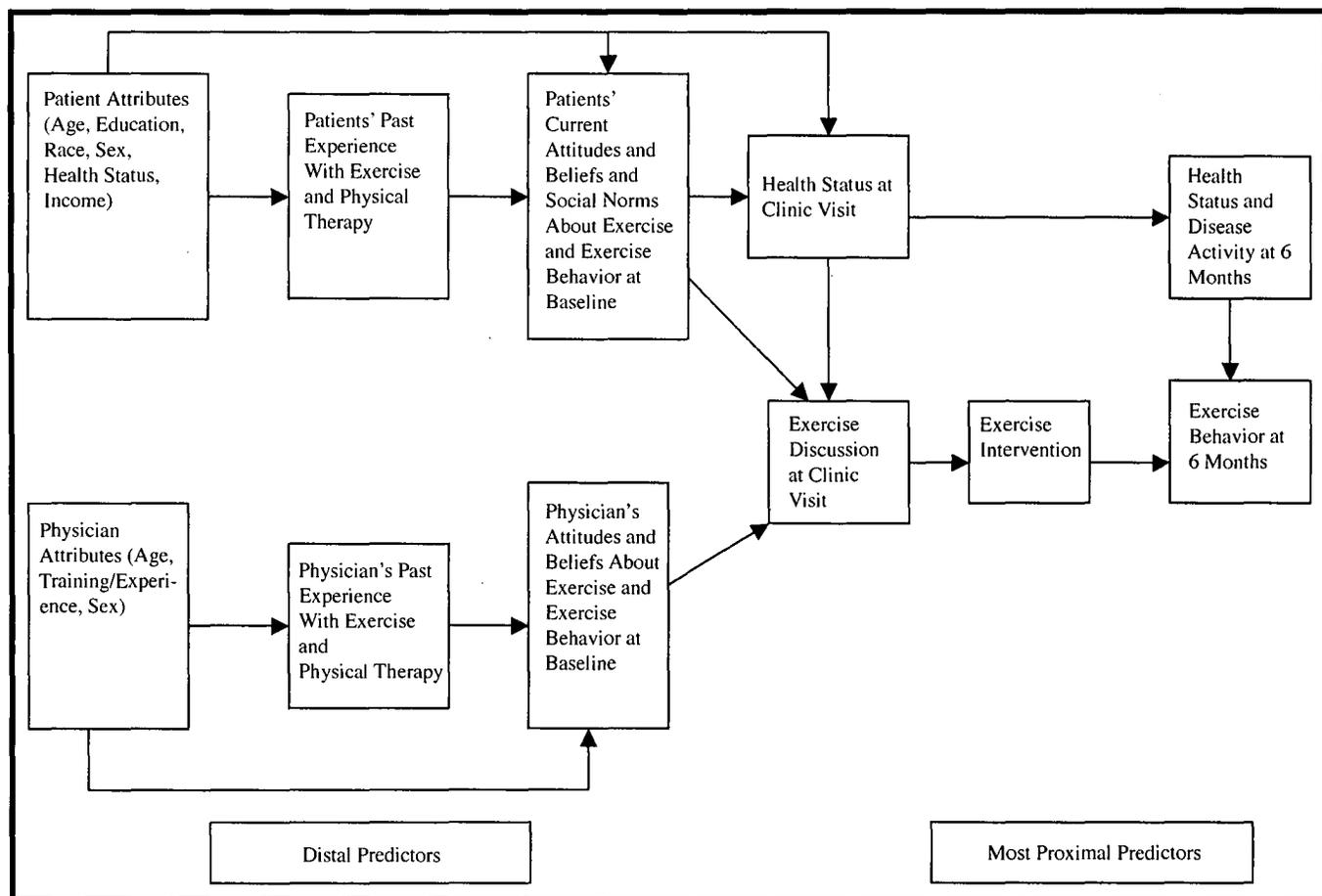


Figure. Hypothesized relationships among variables leading to exercise behavior 6 months following the clinic visit.

age.⁴ For people with arthritis, inactivity can add to the problems of pain, stiffness, loss of range of motion, weakness, and functional limitation.⁵ Additionally, inactive adults with arthritis have higher medical costs than active adults with arthritis.⁶

Nearly 50% of American adults do not participate in physical activity of a vigorous nature.⁷ Individuals with arthritis are less likely than individuals without arthritis to participate in physical activities during their leisure time.⁸ In the general population, among those who begin an exercise program, nearly 50% discontinue exercise within 6 months.⁹ It is well known that exercise adherence plays a vital role in maximizing the benefits associated with physical activity.⁹ Given that patients with arthritis have difficulty adhering to exercise programs and that lack of adherence can affect health status, understanding the factors that influence exercise behavior can lead to the development and maintenance of techniques to promote beneficial, lifelong exercise habits.^{10,11}

Theoretical Model

Encouraging participation in long-term exercise regimens is a challenging task, and there are behavioral

theories that can be of use. Several theoretical models have been developed to aid in understanding the factors associated with exercise participation. The theoretical models used to evaluate exercise behavior in this study were the Theory of Planned Behavior and its earlier formulation, the Theory of Reasoned Action.^{12,13}

Proponents of the Theory of Planned Behavior contend that a behavior can be predicted by an individual's intention to perform that behavior. Intention to perform a behavior, in turn, is influenced by the individual's perceived control over the performance of that behavior, his or her attitude toward performing the behavior, and his or her perception of social pressure or approval from important referent individuals (also referred to as "social norms") to perform the behavior.¹²⁻¹⁷ Attitudes are formed by beliefs about the possible outcomes of a behavior, the likelihood of the outcomes, and the values placed on them. Behavioral control reflects an individual's beliefs regarding the ease or difficulty of performing a behavior and incorporates the individual's past experience as well as anticipated obstacles. Behavioral control is similar to Bandura's self-efficacy construct.¹² A person's belief in his or her own capabilities or confidence, also known as "self-efficacy," plays a role in exercise

behavior.¹⁸ Social norms are determined by the perceived expectations of significant others and the individual's motivation to comply with these expectations (Figure). According to the theory, individuals behave in accordance with their beliefs, and the theory has considerable support for a wide range of voluntary behaviors, including exercise among patient and nonpatient populations.^{14,19-21}

Determinants of Exercise

Numerous determinants of exercise have been documented. In a recent review article, Sherwood and Jeffery²² identified motivation, self-efficacy, state of behavior change, exercise history, body weight, diet, stress, health risk behaviors, social support, time, access, and the attributes of exercise itself as determinants of exercise behavior. Other authors²³⁻²⁸ have reported that health, body weight and composition, fitness level, injury, role models, intensity level, nutrition, and enjoyment of the activity also influence exercise behavior.

In elderly populations, the individual's outcome expectations, self-efficacy, prior exercise, perceived barriers, social network, level of mobility, and education above high school level have been reported as direct determinants of exercise behavior.²⁹⁻³² In elderly people, physical health status, age, marital status, and the person's sex also have been shown to predict exercise behavior indirectly.^{31,32}

When the Theory of Planned Behavior was used to predict exercise behavior, intention to exercise was identified as a predictor of the likelihood of exercise.^{21,33,34} Indirect predictors of exercise, according to this model, include attitude, social norms, and perceived behavioral control, which influence the patient's intention to engage in exercise.^{20,21,33-35}

Researchers also have looked for predictors of exercise in patients with RA. Initial fitness, mood disturbance, behavioral support, and past exercise behavior have been identified as important determinants of exercise in patients with RA and OA.³⁶ Depression and anxiety are negatively associated with participation in exercise.^{36,37} Continuation of exercise behavior has been associated with social activity, social support for exercise, improvement in depression, aerobic capacity, and improvement in self-reported pain.³⁶ Past history of exercise is related to perceived benefits of exercise, which also has been identified as a predictor of exercise behavior.³⁷ In our study, we identified predictors of exercise behavior in patients with RA 6 months following a visit with their rheumatologist.

Method

Design

This prospective study was designed to identify predictors of exercise behavior 6 months following a visit to a rheumatologist for patients with RA. The study was part of a project funded by the National Institutes of Arthritis and Musculoskeletal Skin Diseases, Multipurpose Arthritis and Musculoskeletal Diseases Center, to test an intervention to enhance rheumatologist-patient decision making about major treatment changes to manage active stable RA (nonacute inflammation). The intervention did not address exercise discussions and did not affect the content of this study.

Subjects

The details of the intervention are provided elsewhere by Iversen et al.¹⁴ In brief, rheumatologists and patients were recruited from the arthritis clinic of a major teaching hospital. Forty-two rheumatologists were invited to participate, of whom 25 provided informed consent and completed baseline questionnaires. Three hundred thirty-eight patients met the entry criteria for the study and were approaching a decision milestone (eg, considering a second-line medication or surgery) and were invited to participate. Patient eligibility included being greater than 17 years of age, meeting the American College of Rheumatology criteria for RA,³⁸ and having the ability to complete questionnaires and participate in telephone interviews in English.

One hundred fifty-eight patients agreed to participate, of whom 140 provided informed consent, which included permission to be audiotaped during their clinical encounter. Of the 140 patients, 132 completed the baseline questionnaires (at the time of recruitment), were audiotaped during the clinic visit, and filled out post-encounter survey questionnaires. Of these 132 patients, 113 (85.6%) completed the 6-month survey. The clinical encounters occurred up to 4 weeks after the initial recruitment contact. We used the baseline data, the clinic visit data (audiotapes plus survey items), and self-reports of exercise behavior to identify predictors of exercise 6 months following baseline data collection.

Data Collection and Procedure

After subject consent was obtained, baseline data were collected by the use of questionnaires. The baseline data included demographic information such as age, sex, race, marital and employment status, educational attainment, income, and health insurance data and information on current and past medical and nonmedical treatments. Selected subscales of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) were used to assess pain, physical function, and mental health.^{39,40} Pearson correlation coefficients for 2-week

test-retest reliability were greater than .83 across these dimensions.^{39,40} Self-efficacy for arthritis management, an important factor influencing patients' perception of their general health, was measured using Lorig's Self-Efficacy Other Scale.⁴¹ This scale yields data with high test-retest reliability (Pearson correlations range from .85 to .90).⁴¹ Because RA often affects the hands first and more severely, we used the hand subscale of the Arthritis Impact Measurement Scales (AIMS) as our measure of disease activity. This instrument yields valid and reliable measurements of disease activity in patients with RA.⁴²

Patients reported their expectations for intervention using an expectancy-value questionnaire. This questionnaire asked patients to judge the likelihood of each outcome occurring on 7-point scale with anchors ranging from "extremely unlikely" to "extremely likely." Patients also reported their perceived social support for engaging in exercise and physical therapy and their attitudes toward regular home exercise and weekly physical therapy. These items were developed for our study, and we used 7-point Likert scales with anchors ranging from "unfavorable" to "favorable," based on a technique described by Ajzen and Fishbein.^{12,13} We assessed the patients' experience with exercise and physical therapy (yes/no), defined as past experience(s) with physical therapy, past adherence to an exercise regimen, current use of physical therapy, and current exercise behaviors, at baseline and 6 months following baseline data collection. The patient and rheumatologist, using a brief questionnaire immediately following the clinical encounter, independently reported whether an exercise discussion occurred and whether the patient received an exercise prescription.

Rheumatologists' demographic variables included sex, age, years, and type of experience. Rheumatologists' attitudes and beliefs about home exercise and physical therapy in managing RA were assessed using 12 questions with 5-point Likert response sets ("strongly agree" to "strongly disagree"). The questions measured rheumatologists' self-efficacy for exercise instruction (4 items), beliefs about instruction in exercise such as time constraints, beliefs about the likelihood of patient adherence to exercise (2 items), beliefs about the accessibility of physical therapist services (2 items), beliefs about patients' desire for exercise instruction, beliefs about social norms for prescribing or recommending exercise, and beliefs about physical therapists' ability to provide exercise instruction. These items were summed to create a single rheumatologist attitude scale. Rheumatologists' personal experience with exercise and physical therapy (yes/no) also was assessed at baseline. We also included 3 items about the rheumatologists' attitudes toward the use of specific forms of exercise in managing RA at baseline.

We identified whether patients either received instruction about flexibility exercises, muscle strengthening (isometric, isotonic, weight training), range-of-motion exercises, and aerobic exercises (swimming, treadmill, fast walking, low-impact aerobics, active sports) during the visit or were referred to a physical therapist for instruction in exercise. An *exercise prescription* was defined as an oral or written suggestion that the patient undertake a regular regimen of muscle strengthening, range of motion, or aerobic exercise or a referral to a physical therapist for instruction in exercise. *General exercises* were defined as flexibility exercises, muscle strengthening (isometric, isotonic, weight training) exercises, and range of motion exercises. Aerobic exercises included swimming, treadmill, fast walking, low-impact aerobics, and active sports.

We selected each patient's first audiotaped visit for analysis. A few subsequent visits were substituted when there were technical problems with the taping. Audiotapes were transcribed and edited, using a 3-level transcription process to ensure complete and accurate data. The transcripts were then coded for aspects of communication, concentrating on negotiation of exercise, by coders who were unaware of the patients' and rheumatologists' identity and study groups. Details of the coding protocol are reported elsewhere.¹⁴ For the purposes of this trial, we examined only the presence or absence of discussion and whether or not an exercise prescription was made during the clinical encounter.

Data Analysis

Descriptive statistics provided information on baseline and clinic visit characteristics. The binary outcome, exercise at 6 months following baseline data collection (yes/no), was modeled using logistic regression. Variables were selected and entered into the model based on the proximity to the outcome. The initial block of predictors of exercise behavior at 6 months following baseline data collection were: function at 6 months (SF-36 subscales), disease activity at 6 months as measured by the AIMS, discussion of exercise at the clinic visit, exercise prescription at the clinic visit, expectations of function from treatment at the clinic visit, patients' and rheumatologists' exercise attitudes and beliefs about exercise, patients' self-reports of support for exercise, patients' past experience with exercise, and physicians' exercise behavior. Additional variables included disease severity and disease activity at entry into the study and medication use at baseline. Stepwise methods were used to identify predictors of exercise behavior at 6 months following baseline data collection, with the significance level set at .05 (Figure).

Table 1.
Baseline Demographic Characteristics of Patients With Rheumatoid Arthritis (n=113)

Variable ^a	Number (%)	\bar{X}	SD	Median	Range
Age (y)		54.8	14.4	57	20-94
Female	89 (79)				
Race/ethnicity					
Caucasian	105 (93)				
African American	4 (4)				
Asian	4 (4)				
Education					
Less than high school diploma	39 (35)				
High school diploma or higher	74 (65)				
Income (n=105)					
Less than \$15,000	19 (21)				
\$15,000-\$29,999	27 (24)				
\$30,000-\$49,999	25 (23)				
\$50,000 or more	34 (32)				
Insured	111 (98)				
Lives with someone	87 (77)				
Employed	58 (53.2)				
Duration of disease (y)		9.8	8.7	7	<1-35
SF-36 physical function subscale		49.3	27.5	50	5-95
SF-36 mental health subscale		71	20	76	16-100
SF-36 pain subscale		45.4	22.6	41	12-100
Mean no. of medications		2.2	0.8	2	1-5
AIMs hand subscale score		74	19.4	79	0-100
Currently exercising or receiving physical therapy	42 (37)				
Self-efficacy for managing arthritis		4.6	1.4	4.6	1-7

^aSF-36=Medical Outcomes Study 36-Item Short-Form Health Survey, AIMS=Arthritis Impact Measurement Scales.

Table 2.
Expectations From Intervention, Attitudes and Perceived Social Support for Exercise, Exercise Experience, and Discussion of Exercise in the Clinical Encounter in Patients With Rheumatoid Arthritis (n=113)

	Frequency (%)	\bar{X}	SD	Median	Range
Expectations from intervention at baseline					
Complete pain relief	29 (26)	3.4	2.1	3.0	1-7
Moderate pain relief	93 (83)	5.2	1.7	5.0	1-7
Able to engage in vigorous activities	39 (34.5)	2.8	2.0	2.0	1-7
Able to do moderate physical activities	98 (86.7)	5.4	1.8	6.0	1-7
Positive attitude toward regular exercise to manage arthritis (n=108)	76 (70)				
Perceived positive social support for exercise (n=102)	88 (86)				
Positive attitude toward physical therapy instruction in exercise (n=107)	69 (64)				
Discussed exercise at the clinic visit	66 (58)				
Received exercise instruction or referral for exercise at clinic visit	14 (12)				

Results

Demographic and clinical encounter characteristics of the patients are displayed in Tables 1 and 2. The patient sample was predominantly Caucasian (93%), female (79%), and insured (98%), and 65% had a high school diploma or college education. The patients' mean age

was 54.8 years (SD=14.4, range=20-94). Two thirds of the patients had a diagnosis of RA for less than 5 years (\bar{X} =9.8 years, SD=8.7, range=<1 to 35). About half of the study participants were employed, and 87 participants (77%) lived with someone. These patients experienced a moderate level of physical impairment and pain,

Table 3.

Rheumatologists' Beliefs and Attitudes About Exercise in Managing Rheumatoid Arthritis (n=24)

	Agree				Disagree
	1	2	3	4	5
Patients will adhere to exercises	0%	9%	29%	31%	31%
Instructing patients in exercise takes more time than I have	44%	40%	15%	1%	0%
Most of my patients want an exercise program	0%	38%	26%	19%	17%
I prescribe exercise more than my peers	0%	20%	43%	35%	2%
I feel confident I know when exercises are appropriate	16%	35%	21%	28%	0%
I feel confident I can effectively instruct patients in exercises	0%	22%	13%	45%	20%
Physical therapists can instruct patients effectively in exercises	83%	14%	3%	0%	0%
For most exercise programs, I can instruct patients as effectively as a physical therapist	0%	1%	10%	25%	65%
Patients usually follow up on a physical therapist referral for exercise	2%	45%	34%	19%	0%
Patients usually get an appointment for physical therapy as soon as they need it	0%	6%	19%	29%	46%
Most patients can afford to see a physical therapist for exercise instruction	0%	2%	29%	42%	27%
An instruction sheet for exercise is as effective as a referral to a physical therapist for exercise	0%	15%	5%	25%	55%

as measured by the SF-36. The mean SF-36 physical function subscale score was 49.3 (SD=27.5, range=5-95), and the mean SF-36 pain subscale score was 45.4 (SD=22.6, 12-100). Disease activity was measured using the AIMS hand subscale score. The mean AIMS hand subscale score was 74 (SD=19.4, range=0-100). The mental health status of the sample was similar to population norms. The patients had moderate self-efficacy (confidence) in arthritis management (\bar{X} =4.6, SD=1.4, range=1-7). At baseline, only 42 patients (37%) were exercising, and 11 patients (10%) stated they had never tried exercise in their life.

Patients' expectations regarding relief from pain and ability to perform physical activities with intervention varied (Tab. 2). Eighty-three percent of the patients reported that they expected moderate relief from pain versus 26% who expected complete relief from pain with intervention. Ninety-eight patients (86.7%) reported they expected to be able to perform moderate physical activities (eg, walking, doing errands, climbing stairs), while 39 patients (34.5%) expected they could perform vigorous physical activities (eg, sports, hiking, heavy gardening). Thirty percent of the patients expressed an unfavorable attitude toward performing regular home exercises to manage symptoms, and 12% stated that their family and friends would disapprove of them performing regular home exercise to manage symptoms. During the clinical encounter, 66 patients (58%) discussed exercise with their rheumatologist, and 14 patients (12%) received an exercise prescription.

Of the 25 rheumatologists participating in the trial, 18 (72%) were male. Four rheumatologists (16%) were fellows, 8 (32%) were junior faculty, and 13 (52%) were

senior faculty (defined as having at least 5 years of clinical experience). Thirteen rheumatologists (52%) were primarily lab scientists. The mean age of the rheumatologists was 43 years (SD=10.4, range=31-62), and 10 rheumatologists (42%) reported that they engaged in regular exercise. Although 19 rheumatologists (79%) believed that range of motion exercises are useful in managing RA, 14 rheumatologists (58%) believed strengthening exercises are useful and only 10 rheumatologists (42%) believed aerobic exercises are useful in the management of RA. Rheumatologists' attitudes and beliefs about the effectiveness of exercise, their ability to teach exercises, and patients' desire to receive an exercise program varied (Tab. 3). Thirty-eight percent of the rheumatologists believe their patients want an exercise program, and only 9% reported their patients would adhere to an exercise program. Fifty-one percent reported they felt confident that they knew when exercises were appropriate for their patients, but only 22% reported they felt confident they could effectively instruct patients in exercises. However, 97% of the rheumatologists' believed physical therapists were effective in teaching exercises to their patients, and 85% believed exercise instruction was more effective than a sheet outlining exercises.

Disease activity and function are known predictors of exercise behavior. Therefore, we measured function and disease activity 6 months following the patients' initial visit. At the end of the 6-month study period, although roughly 80% of the patient sample had changed their medication at least once, there was little change. This is indicated by the fact that the AIMS hand subscale score remained nearly the same during the study period (mean baseline score=74.2 versus mean score at 6

Table 4.

General Features of Patients With Rheumatoid Arthritis 6 Months After the Clinical Encounter (n=113)^a

	Frequency (%)	\bar{X}	SD	Median	Range
AIMS		74.9	20.0	77.5	12.5-100
SF-36					
Physical function		53.0	28.3	60	0-100
Mental health		70.8	19.0	72	16-100
Pain		52.5	22.6	51	0-100
Exercising	34 (27)				

^aSF-36=Medical Outcomes Study 36-Item Short-Form Health Survey, AIMS=Arthritis Impact Measurement Scales.

months after baseline data collection=74.9). There were no improvements in scores on the physical function and pain subscales of the SF-36. With regard to the outcome variable (ie, participation in exercise at 6 months following the initial visit), only 34 study participants (27%) reported they were still exercising. Patients' functional status and exercise behavior 6 months after baseline data collection are displayed in Table 4.

Logistic regression was used to identify predictors of exercise behavior 6 months following the visit to the rheumatologist. Adjusting for other covariates, there were 2 variables that predicted exercise in our model (Tab. 5). Past history of exercise was the strongest predictor of exercise behavior (odds ratio=6.8, 95% confidence interval=3.1-15.0). Patients who exercised in the past were nearly 7 times more likely than patients who had not exercised to be participating in exercise 6 months following the baseline clinic visit. The physicians' exercise behavior was the second predictor of exercise behavior. If a patient's rheumatologist exercised regularly, the patient was 26% less likely to engage in exercise (95% confidence interval=0.09-0.77) 6 months following the baseline clinic visit. The model used to predict exercise behavior in this study had good predictive ability (C statistic=.77), indicating that past exercise history and rheumatologists' exercise behavior together correctly predict exercise behavior 77% of the time.

Discussion and Conclusions

This study aimed to identify predictors of exercise behavior in patients with RA 6 months after a clinic visit with a rheumatologist. We found past history of exercise and rheumatologists' exercise behavior to be predictors of patients' exercise behavior 6 months after the clinic visit. Patients' current exercise behavior is greatly influenced by past exercise experiences. Because RA is a lifelong condition that can be managed, in part, through exercise, this is a very important factor to consider. Past participation in exercise has been reported to be the

Table 5.

Predictors of Exercise Behavior in Patients With Rheumatoid Arthritis 6 Months After the Clinical Encounter (n=113)^a

	Odds Ratio	95% Confidence Interval
Patient's past history of exercise	6.8	3.1-15.0
Physician's current exercise behavior	0.26	0.09-0.77

^aModel C statistic=.77.

best predictor of behavior,²⁰ and our results concur with this conclusion. In our sample, the percent of individuals exercising after 6 months decreased by 10%, from 37% to 27%, substantially less of a drop than is seen in general US samples. The importance of past exercise as a predictor of current exercise behavior appears to be related to the persistence of certain factors that lead people to perform or not to perform exercise over-time.²⁰ For example, past participation in physical exercise influences self-efficacy for exercise and physical activity skills.²² Therefore, a positive experience will enhance self-efficacy and promote skills related to exercise, and a negative experience (the person finds the exercises are too difficult or fears that exercise may increase his or her discomfort levels) may negatively influence exercise behavior.

Given that self-efficacy has been shown to be a strong and consistent predictor of exercise behavior,²² we initially felt that self-efficacy would be a predictor of exercise behavior in this sample of patients with RA. However, as we found, this was not the case. In our model, self-efficacy and perceived behavioral control were not determinants of exercise. Current literature shows that the influence of past exercise behavior may extinguish the influences of attitude, subjective norms (defined as perception of social pressure or approval from important referent individuals) to perform the behavior, and perceived behavioral control on intention to perform exercise when past exercise behavior is included in regression analyses.²⁰ This may occur because past exercise experience takes into account a person's attitudes, subjective norms, and self-efficacy, resulting in an additive effect that makes the variable "past exercise experience" that much more important, ultimately shadowing the individual aforementioned variables.

Physicians' involvement in promoting exercise is very important. Primary care physicians who exercise are more likely to counsel their patients on the benefits of exercise.⁴³ Additionally, physicians who practice good health habits are more likely to counsel their patients about all health habits, including exercise.⁴⁴ In contrast

to previous research^{43,44} illustrating that physicians who exercise are more likely to promote exercise for their patients, our study showed that rheumatologists who exercised were less likely to have patients who were exercising 6 months after the clinic visit. The previous research,^{43,44} however, tended to focus on primary care physicians and samples without chronic conditions. Among our sample of rheumatologists, only 38% believed their patients wanted an exercise program and only a minority (9%) believed their patients would adhere to an exercise program. Although many reasons may exist for these beliefs about exercise behavior, one possible explanation may be that these rheumatologists felt exercise was too difficult for their patients given their chronic disease status.

Fifty-one percent of the rheumatologists reported they felt confident that they knew when exercises were appropriate for their patients with RA, but their beliefs about the effectiveness of various forms of exercise (aerobic and strength training) did not reflect the literature on exercise. Given the rheumatologists' beliefs regarding aerobic exercise in managing RA reported in this article, it is possible that rheumatologists tend to spend more time keeping current with the latest medications for RA, rather than keeping abreast of the literature reporting the benefits of exercise for RA management. Because the rheumatologists' beliefs do not reflect the current literature,^{45,46} we are suggesting that perhaps the physicians in our study were under the impression that an exercise program would have detrimental effects for their patients with RA. Physician education concerning the value of aerobic exercise in managing early RA, we believe, is needed. Another possible explanation for the negative influence of physician exercise behavior on patients' exercise may be that rheumatologists who engage in regular exercise view it as too strenuous for their patients with RA. Considering that patients who receive exercise advice from their primary care physician exercise more than patients who do not receive exercise advice, it is especially important for rheumatologists to stay current with exercise literature and counsel their patients to exercise or refer to physical therapists for instruction in exercise.⁴⁷

Limitations of this study include questions of generalizability of the data to other patients with RA and physicians other than rheumatologists. The patients were primarily college-educated, Caucasian women whose experiences with exercise may differ from those of other populations. This study was also restricted to patients with active disease status, and these patients may have different beliefs and attitudes than patients in an inactive disease state about the usefulness of exercise in the management of their arthritis. Furthermore, this inclusion criterion leaves out those patients who may be newly

diagnosed or in a more chronic phase of the disease. Finally, the original study questionnaires documented when the physicians and patients discussed various intervention options. However, the questionnaires did not differentiate between general exercise programs and physical therapy. We were specifically looking at whether patients were exercising 6 months following their visit to a rheumatologist and patients who may be exercising under the supervision of a physical therapist may not have considered that as exercising when asked about it.

Strengths of our study include that it examined the contribution of both patients' and rheumatologists' beliefs about and experiences with exercise to the likelihood and extent of exercise participation and behaviors in the management of the patients' disease. We contend it is important to look at both aspects because previous studies⁴⁸⁻⁵⁰ have shown that patients look up to and are greatly influenced by their physicians when it comes to deciding the best intervention options and managing their RA. The hierarchical model and multivariate logistic regression analysis of our study allowed for the examination of the impact of patients' personal histories of exercise and rheumatologists' exercise behaviors on patient exercise behaviors. They also allowed for examination of the likelihood of each variable relating to exercise behavior 6 months after the clinic visit, as well as the overall importance of each variable. In addition, the theory-based approach to modeling the outcomes enhances the quality of the study. The theoretical models we used have been well-established, and they explain multiple facets of a person's behavior. We propose that future studies should be conducted to examine exercise behavior in newly diagnosed patients with RA to determine appropriate interventions in hopes of enhancing overall self-efficacy in performing such activities.

The past few decades have produced dramatic changes in physical activity patterns in the United States. Low levels of activity are increasingly recognized as important contributors to increased disability among people with chronic health problems, including musculoskeletal diseases such as OA, RA, and fibromyalgia.^{51,52} We examined patient and physician beliefs, attitudes, and past exercise behavior and rheumatologist-patient exercise discussions to identify and gain a better understanding of predictors of exercise behaviors 6 months following a clinic visit in individuals with RA. Previous studies^{22-28,36,37} have shown a pattern of intrapersonal and social correlates of physical activity. Although we recognize that disease severity, and correspondingly medications, may change over time, the key predictors of exercise behavior are patients' previous history of exercise and rheumatologists' exercise behavior.

The associations we found provide a basis for developing further hypotheses regarding intervention approaches. Although available data on the efficacy of various intervention strategies are just beginning to accumulate, physical activities that are engaging and enjoyable, in general, are vital to promoting positive experiences and increasing self-efficacy regarding the activities, as well as encouraging increased and sustained participation in such exercise behaviors.

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