Physical Activity Levels Among Participants in the Robert Wood Johnson Foundation Diabetes Initiative

Pamela A. Williams-Piehota, PhD, Lauren A. McCormack, PhD, MSPH, Carla M. Bann, PhD, Mary O'Toole, PhD, Joseph Burton, MS, Shawn Karns, BA, Linda Lux, MPA, and Douglas Kamerow, MD

Abstract

Objective. The purposes of this study were to describe physical activity habits of individuals with type 2 diabetes participating in a self-management initiative conducted in real-world settings that was sponsored by the Robert Wood Johnson Foundation (RWJF); to assess changes in physical activity over time; and to identify factors associated with physical activity levels.

Research design and methods. Clinical and community-based programs participating in the RWJF-funded Diabetes Initiative implemented comprehensive models for self-management, including supports to increase physical activity. A cohort of 622 largely lower-income and ethnic minority program participants (72% female, 85% overweight or obese) completed telephone surveys assessing self-reported physical activity levels at two times that were about 8 months apart.

Results. Approximately 70% of participants who reported being inactive at Time 1 reported at least some physical activity at Time 2. Approximately 29% of participants who reported insufficient activity at Time 1 increased their activity enough to meet current public health guidelines at Time 2, whereas 28% of those who were sufficiently active no longer met the guidelines. Sufficient physical activity was associated with greater intervention intensity; being male, younger, and speaking English; and having greater self-efficacy, a lower BMI, and a health care provider who assisted in finding physical activity resources.

Conclusions. Personal, behavioral, and program factors were related to physical activity levels among participants in these comprehensive self-management programs.

An estimated 20.8 million people in the United States have diabetes.[1] The American Diabetes Association[2] recommends that physical activity be part of a lifestyle intervention to reduce morbidity in individuals with type 2 diabetes. However, despite clear evidence that an appropriate amount of physical activity is beneficial in managing type 2 diabetes,[3] 26% of individuals with diabetes do not participate in any leisure-time physical activity, and an additional 41% fail to accumulate a sufficient amount of physical activity to meet public health guidelines of 150 minutes of moderate activity per week.[4–6] Clearly, effective interventions for increasing physical activity are urgently needed.

Physical activity is one of the behaviors that diabetes self-management programs aim to change. Although the ultimate goal is to increase physical activity to levels that meet the public health guidelines,[5] such improvements may be unrealistic. For example, a volunteer-delivered motivational telephone support program for older adults with diabetes at community clinics increased participants' physical activity levels, but not to the point that they were more likely to be sufficiently active.[7] Similarly, a clinic- and community-based intervention emphasizing moderate-intensity

Address correspondence to Lauren A. McCormack, PhD, MSPH, Director, Health Communication Program, RTI International, 3040 Cornwallis Rd., P.O. Box 12194, Research Triangle Park, NC 27709.

physical activity and delivered in part by peer counselors resulted in modest improvements in the activity levels of older African-American women.[8] In another case, exercise consultations with a trained research assistant and based on the Transtheoretical Model led participants to meet the guidelines.[9] Small increases may be a first step in an individual's progression from complete inactivity to eventually meeting recommended guidelines.

The Robert Wood Johnson Foundation (RWJF) Diabetes Initiative funded six grantees to develop and implement self-management programs in primary care settings and another eight grantees to demonstrate partnerships between clinical and community organizations for increasing community resources and supports for self-management.[10] These demonstration projects spanned the United States, were located in both urban and rural settings, and served patient populations who were predominantly indigent, medically underserved, or from varied cultural and linguistic backgrounds. The program's goal was to demonstrate the feasibility of self-management interventions in both clinical and community locations in diverse, real-world settings and among groups sustaining disproportionate disease burden of diabetes and other chronic diseases. Physical activity was one of the behaviors the Diabetes Initiative programs endeavored to change.

This article describes the self-reported physical activity levels of individuals with type 2 diabetes participating in the Diabetes Initiative. A second objective is to examine changes in physical activity over time. The authors also sought to identify factors associated with physical activity levels.

Table 1. Demographic Characteristics of Respondents (*n* = 622)

Characteristic	*n*	%
Age (years)		
< 50	153	25
50–59	212	34
60–69	167	27
≥ 70	89	14
Female	448	72
Hispanic	316	51
Race		
American Indian	73	12
African American	61	10
Caucasian	315	51
Other	170	27
Average yearly household income		
< $10,000	234	38
$10,000–$19,999	167	27
$20,000–$29,999	62	10
≥ $30,000	105	17
Spanish speaker	287	46
Current smoker	184	14
BMI (Time 1)		
Underweight	4	1
Normal	65	10
Overweight	143	23
Obese	386	62

RESEARCH DESIGN AND METHODS

Participant Characteristics

After receiving human-subjects approval, the authors administered a longitudinal survey in both English and Spanish (based on the preference of the respondents) to participants across 12 of the 14 programs funded by the Diabetes Initiative. (Two of the sites determined that their population would not respond to a telephone survey and therefore were not included.) The survey was conducted using computer-assisted telephone interviewing (CATI) software from January and February 2006 (Time 1), with a 67% response rate (957/1,461), and again from September to November 2006 (Time 2), with a 56% response rate (939/1,677). In this article, we focus on a subsample from the survey: 622 participants for whom we had complete data on the physical activity measure at both time points. Table 1 displays the demographic characteristics of participants.

Description of Interventions

The programs of the Diabetes Initiative attempted to improve self-management by focusing on increasing knowledge and awareness, improving teaching and practicing skills, and providing ongoing follow-up and support to participants. It was anticipated that improved self-management would lead to an increase in healthy behaviors, including physical activity. Several of these multifaceted programs included nutrition/weight loss activities, smoking cessation programs, use of community health workers, or use of a diabetes register. All programs used goal-setting, action-planning, and problem-solving strategies to help participants take charge of their daily lives. These strategies are also common in programs used successfully to increase physical activity.[11] These strategies were implemented during diabetes self-management education classes and reinforced via ongoing follow-up and support.

Table 2. Survey Response Rates and Self-Management Supports Used by Diabetes Initiative Programs to Increase Physical Activity

			Type of Patient Support			
Site	**Time 1 Survey Response Rate**	**Time 2 Survey Response Rate†**	**Goal Setting/ Action Planning/ Problem Solving**	**Increasing Knowledge/ Awareness**	**Teaching/ Practicing Skills**	**Follow-Up and Support/ Sustaining Behavior Change**
1	62.8% (161/265)	50.7% (186/370)	Addressed during provider and CDE visits. Patients may set goals to attend exercise classes or walking groups, use pedometers, or be active with friends, family, or alone	Patient handouts explaining benefits of physical activity; "tip of the week" for providers; group session education modules	One-on-one sessions with CDE to learn techniques; group sessions with videotaped demonstrations	Reviewed goals at each provider (PCP, nurse) and CDE visit
2	69.9% (111/160)	49.4% (78/158)	Addressed during Help Yourself class, medical group visits, support group meetings, and at Easy Does It Yoga	Help Yourself class, nurse-led education class, Are You Ready materials; monthly newsletter	Yoga	Classes, support groups, monthly newsletter
3	69.2% (116/170)	57.2% (95/168)	Encouraged by *promotoras* to set small goals to be physically active	Presentations, discussions as part of curriculum on safety, benefits, and injury avoidance	Development of an exercise plan using the FIT concept	*Promotora* follow-up
4	72.1% (139/194)	66.0% (134/204)	Goals were set in diabetes education classes and during provider visits	Information in classes and from providers during visits	Exercise classes	Ongoing exercise classes
5	57.1% (103/185)	57.7% (155/275)	Transtheoretical Model was used as basis for setting goals with RD, in diabetes education classes, and with *promotoras*	Use of Transtheoretical Model materials to convey information in RD visits, DSME classes, and provider visits and from *promotoras*	Walking groups, *promotora* interactions	*Promotora* and RD follow-up, walking groups
6	80.7% (29/37)	63.6% (42/66)	Goals were set during planned visits with MA and/or during group medical visits	Walking club, exercise video, pedometer program, group medical visits	Walking groups	Physical activity focus to group visit one time per year
7	73.9% (50/71)	70.4% (50/71)	Goals were set with a fitness instructor	As a part of education classes and support group meetings	As part of support group meetings	Physical activity tracking

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Table 2. Survey Response Rates and Self-Management Supports Used by Diabetes Initiative Programs to Increase Physical Activity, *continued from p. 172*

			Type of Patient Support			
8	62.1% (18/29)	66.7% (8/13)	One education class was focused on setting goals to change activity behavior	Classes on physical activity with worksheet kept by participants	Some physical activity during classes and support group meetings	Pedometers, goal trackers, exercise during support group meetings
9	67.9% (87/132)	46.1% (86/190)	Goal setting for physical activity was part of DSME classes; lay health educators helped participants set physical activity goals	Classes and the Move More program	One-on-one with lay health educators	Lay health educators in the Move More program
10	78.4% (28/38)	57.1% (44/77)	Case manager helped participants set physical activity goals	Personal training sessions	Personal training sessions, weekly exercise classes	Weekly exercise classes, outreach follow-up
11	87.8% (36/41)	82.5% (33/40)	Physical activity goals and action plans are reviewed at all provider visits	Classes, support groups, and individual provider visits	Exercise classes 2 times per week	Walking groups at churches and workplaces; walking group
12	76.3% (31/43)	63.7% (28/45)	Individual appointments with a program specialist	Diabetes education group, newspaper articles, brochures, and handouts	None	Special events (e.g., hikes, bike rides, walking partners, walking trail)

†The survey sample for Time 2 included both Time 1 respondents who completed the survey at Time 2 and any new participants in the programs at Time 2. CDE, certified diabetes educator; DSME, diabetes self-management education; MA, medical assistant; PCP, primary care provider; RD, registered dietitian.

Table 2 provides a brief overview of the 12 Diabetes Initiative programs, including examples of self-management supports used by the programs to increase physical activity behavior.

Depending on the needs, interests, and foci of the individual programs, participants had additional group or individual opportunities to learn and use strategies to increase physical activity. Examples include using a fitness instructor for one-on-one consultation, developing an instructional exercise video, incorporating families into patients' physical activity routines, using pre- and post-exercise blood glucose testing to demonstrate the change in blood glucose after exercise, disseminating maps of walking trails and locations for indoor walking, distributing incentives (e.g., pedometers, exercise logs, or water bottles) to participants, and using social marketing messages at worksites and in local newspapers to encourage physical activity.

Dependent Measures

We used seven items from the 2005 Behavioral Risk Factor Surveillance System (BRFSS) physical activity module[4] developed for telephone administration to assess moderate and vigorous levels of physical activity. Using BRFSS scoring algorithms, we calculated the proportion of participants who fell into each of the following three categories based on the Centers for Disease Control and Prevention–American College of Sports Medicine guidelines[5,6]: *1*) sufficiently active: ≥ 30 minutes of moderate-intensity physical activity for ≥ 5 days per week *or* ≥ 20 minutes of vigorous-intensity physical activity for ≥ 3 days per week (i.e., meeting the guideline); *2*) insufficiently active: moderate- or vigorous-intensity physical activity but not at a level that meets the guideline; and *3*) inactive: no physical activity. We then created a three-level physical activity variable based on these three categories.

Independent Measures

Sociodemographic and health-related variables. Age, sex, ethnicity, race, and income were assessed. Respondents also reported height and weight, which were used to compute their BMI. Smoking status (current smoker or not current

Table 3. Time 2 Physical Activity Levels According to Time 1 Activity Levels

	Physical Activity at Time 1		
Physical Activity at Time 2	**Inactive (*n* = 114)**	**Insufficiently active (*n* = 251)**	**Sufficiently active (*n* = 257)**
Inactive (*n* = 74)	35 (31%)	25 (10%)	14 (5%)
Insufficiently active (*n* = 275)	49 (43%)	153 (61%)	73 (28%)
Sufficiently active (*n* = 273)	30 (26%)	73 (29%)	170 (66%)

Percentages represent the proportions of participants who began with the activity level at Time 1. For example, 31% (or 35/114) of those who were inactive at Time 1 were inactive at Time 2.

smoker) was assessed by asking whether they have smoked at least 100 cigarettes in their entire life and whether they currently smoke cigarettes every day, some days, or not at all. These questions mostly came from the BRFSS 2005 questionnaire. We also recorded whether surveys were conducted in Spanish, providing an indicator of whether the individuals' primary language was Spanish.

Psychosocial variables. We assessed selected psychosocial constructs that can affect physical activity levels. All variables were on a Likert scale of between 4 and 7 response choices. Social desirability was measured using two items: "No matter who I talk to, I'm always a good listener"[12] and "I always know why I like things."[13] Self-efficacy for diabetes self-care was assessed with, "How confident are you that you can solve problems related to your diabetes?" To assess whether respondents had received help from a provider in finding places to exercise, they answered, "In the past 3 months, how often did someone on your diabetes care team help you find places where you can get physical activity or exercise? By places we mean things like a gym, pool, playing field, park, court, or recreation center."

Intervention intensity proxy variable. We gauged the depth and breadth of the grantees' interventions by identifying whether they focused on one or more of three content areas or provided services in one of three ways. The three content areas were *1*) promoting healthy eating, *2*) promoting physical activity, and *3*) promoting healthy coping skills. The three structural service components were *1*) utilizing lay health workers, *2*) running multisession diabetes education classes, and *3*) using telephone follow-up and support. The RWJF National Program Office, which coordinated the program, and the program evaluators independently rated the intervention components as either 0 (low-intensity) or 1 (high-intensity), resulting in high inter-rater reliability. For the limited number of cases in which there was a difference in ratings, the two groups met to make a final determination. This information was used to create a scale reflecting the relative intensity of services provided by each program, potentially ranging from 0 to 6, with 6 being the most intensive programs.

Statistical Analyses

We examined the distribution of participants at each of the three physical activity levels (inactive, insufficiently active, and sufficiently active) at the two time points. To examine individual changes in physical activity over time, we calculated the percentage of participants who were in each level of activity at Time 1 who remained at the same level or changed levels at Time 2. Using a multinomial logistic regression model, we predicted physical activity level at both time points based on demographics, intervention intensity, help finding a place to exercise, social desirability, and survey wave (Time 1 or Time 2, to account for differences over time). The model was estimated using generalized estimating equations to account for correlated errors among participants' measurements over time and among participants within the same program. We also ran a comparable logistic model simply predicting whether participants were sufficiently active (as previously defined), rather than using all three physical activity levels; the results for this model were similar to the results for the multinomial model and are not reported here.

RESULTS

At Time 1, 18% of individuals enrolled in the Diabetes Initiative reported being inactive, with the percentage decreasing to 12% at Time 2. At Time 1, 40% of individuals enrolled in the Diabetes Initiative reported participating in some, but insufficient amounts of, physical activity. At Time 2, that percentage increased to 44%. At Time 1, 41% of participants were sufficiently active to meet public health guidelines, with that percentage increasing to 44% at Time 2. For the sample as a whole, participants generally became more active over time.

When examining individual changes in physical activity over time, nearly 70% of individuals who were inactive at Time 1 were doing some activity (insufficient or sufficient) at Time 2, and the majority of those who were active at Time 1 remained active at Time 2 (Table 3). The majority of those who were insufficiently active tended to remain in that category (61%), and the majority of those who were sufficiently active continued to participate in an appropriate amount of activity (66%). Of those who reported insufficient activity at Time 1, 29% increased their activity enough to meet public health guidelines at Time 2. At the same time, approximately the same proportion (33%) of those who were sufficiently active at Time 1 decreased their activity so that they no longer met the guidelines. In short, the greatest changes were seen in inactive individuals becoming active (insufficiently or sufficiently) over time.

The results of the multinomial logistic regression model predicting physical activity levels suggest an increase in physical activity over time after accounting for other possible predictors of physical activity (Table 4). The odds for being sufficiently active compared to being inactive, and for being insufficiently active (vs. inactive) were both higher at Time 2 than at Time 1 ($P = 0.001$ and $P < 0.001$, respectively). The following characteristics were associated with being sufficiently active (compared to inactive): enrollment in a more intensive intervention, being male, being younger, responding to the survey in English, and having a higher self-efficacy for diabetes self-care, a lower BMI, and a health care provider who assisted in finding physical activity resources. Factors associated with those who were insufficiently active (compared to inactive) included being male, responding to the survey in English, having higher self-efficacy for diabetes self-care, and having a provider who assisted in finding physical activity resources.

CONCLUSIONS

The physical activity levels of individuals participating in the Diabetes Initiative showed that > 40% were somewhat active and another 40–45% were meeting the physical activity guidelines. A second finding was that inactive participants tended to increase their activity over time, but not to the point of being sufficiently active. Similarly, some other researchers have found that interventions using the types of behavioral approaches that these diabetes self-management programs used have led people with type 2 diabetes to increase their physical activity, but not to the level of meeting the public health guidelines.[7,8]

However, when we examined factors associated with physical activity levels, we found the more intensive Diabetes Initiative interventions were associated with participants meeting the public health guidelines for physical activity, more so than the less intensive interventions. More intensive interventions were those that focused on more content areas (i.e., healthy eating, physical activity, and healthy coping skills) and had more structural service components (i.e., lay health workers, multisession diabetes education classes, and telephone follow-up and support). This finding may suggest that if clinicians implement intensive self-management programs that focus on participants taking control of their diabetes, they may also have a higher likelihood of increasing participants' physical activity levels.

Other than the relative intensity of the interventions, both personal characteristics and having a health care provider who assisted in finding physical activity resources were associated with physical activity levels. Some of these findings are consistent with the examination by Trost et al.[14] of the correlates with physical activity in adults in general: age, race/ethnicity (nonwhite), and overweight/obesity each have a repeatedly documented negative association with physical activity, and sex (male), self-efficacy, physician influence, and access to facilities each have a repeatedly documented positive association with physical activity.

The lack of a control group in this study limits the conclusions that can be drawn from the data. Further, the lack of a baseline measure prevents us from confidently attributing the increased activity levels over time to the impact of the interventions. It is also possible that a selection bias may be present because program participants who agreed to participate in the survey may have had a greater investment in their health or in the Diabetes Initiative programs. The Initiative did not require grantees to implement a single self-management intervention across 14 sites. Instead, grantees implemented a variety of different self-management intervention strategies according to their settings, populations, and organizational resources. We developed the intervention intensity proxy variable to capture these programmatic differences as best we could, although admittedly it is not the most rigorous measure. In addition, we did not collect data on which programmatic components participants took part in at their intervention site. This cross-site evaluation was conducted in real-world settings and faced real-world constraints on the design of the evaluation and the data we could collect. Future work in this area would benefit from a more rigorous study design.

Although the study was unable to follow participants from their inception to the end of the Initiative, we analyzed the self-reported physical activity levels of participants in self-management interventions in diverse, real-world settings at two time points. For the majority of participants, physical activity increased over this period, even controlling for the potential social desirability of responses. Although some of the factors associated with physical activity levels were personal factors impervious to change, the findings imply that interventions that help participants find places to exercise and improve their confidence in being able to solve problems related to their diabetes may increase physical activity as well.

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Table 4. Multinomial Logistic Model Predicting Physical Activity Level (n = 622)

	Sufficiently Active vs. Inactive			Insufficiently Active vs. Inactive		
Variable	OR	95% CI	*P*	OR	95% CI	*P*
Time						
1	REF			REF		
2	1.74	1.24–2.42	0.001	1.82	1.29–2.56	< 0.001
Intervention intensity	1.25	1.02–1.53	0.032	1.15	0.95–1.39	0.143
Sex						
Male	2.62	1.56–4.38	< 0.001	1.66	1.00–2.74	0.050
Female	REF			REF		
Age	0.97	0.95–0.99	0.004	0.99	0.97–1.01	0.229
Average yearly household income						
< $10,000	1.49	0.71–3.14	0.293	1.37	0.69–2.73	0.366
$10,000–$19,999	1.44	0.69–2.97	0.327	1.70	0.87–3.32	0.120
$20,000–$29,999	1.22	0.50–3.01	0.663	1.41	0.64–3.13	0.397
≥ $30,000	REF			REF		
Spanish speaker						
Yes	0.38	0.22–0.67	< 0.001	0.47	0.28–0.77	0.003
No	REF			REF		
Smoking status						
Current smoker	1.50	0.71–3.18	0.291	1.41	0.70–2.85	0.335
Not a current smoker	REF			REF		
Self-efficacy	1.43	1.12–1.84	0.004	1.21	0.97–1.52	0.088
BMI	0.92	0.89–0.95	< 0.001	0.98	0.95–1.01	0.114
Help from provider in finding places to exercise	1.26	1.09–1.45	0.002	1.12	0.97–1.28	0.119
Social desirability	1.33	0.85, 2.07	0.217	1.05	0.69, 1.59	0.830

OR, odds ratio.

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Pamela A. Williams-Piehota, PhD, is a research psychologist; Lauren A. McCormack, PhD, MSPH, is director of the Health Communication Program; Carla M. Bann, PhD, is director of Program Evaluation & Outcome Measurement; Joseph Burton, MS, Shawn Karns, BA, and Linda Lux, MPA, are health policy researchers; and Douglas Kamerow, MD, is chief scientist at RTI International in Research Triangle Park, N.C. Mary O'Toole, PhD, is deputy director of the National Program Office of the Robert Wood Johnson Foundation Diabetes Initiative in the Washington University School of Medicine Division of Health Behavior Research in St. Louis, Mo.