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Patterns of Yoga Practice and Physical Activity Following a Yoga Intervention for Adults With or at Risk for Type 2 Diabetes

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Abstract

Background—The current study described patterns of yoga practice and examined differences in physical activity over time between individuals with or at risk for type 2 diabetes who completed an 8-week yoga intervention compared with controls.

Methods—A longitudinal comparative design measured the effect of a yoga intervention on yoga practice and physical activity, using data at baseline and postintervention months 3, 6, and 15.

Results—Disparate patterns of yoga practice occurred between intervention and control participants over time, but the subjective definition of yoga practice limits interpretation. Multilevel model estimates indicated that treatment group did not have a significant influence in the rate of change in physical activity over the study period. While age and education were not significant individual predictors, the inclusion of these variables in the model did improve fit.

Conclusions—Findings indicate that an 8-week yoga intervention had little effect on physical activity over time. Further research is necessary to explore the influence of yoga on behavioral health outcomes among individuals with or at risk for type 2 diabetes.

Keywords

mind-body; longitudinal; health; health behavior

Global increases in the incidence and prevalence of type 2 diabetes mellitus confirm the growing concern that diabetes has reached epidemic proportions and is an urgent priority for health care professionals in the United States and around the world.^{1,2} Rates of obesity continue to climb, likely because of contemporary realities: longer work hours in sedentary job positions, fast-food conveniences, labor-saving devices, and inactive forms of recreation.³ Recent reports estimate that 65% of adults living in the United States are either overweight or obese.⁴

Research findings have consistently pointed to the link between obesity and type 2 diabetes.⁵⁻⁷ The rationale for public health intervention is compelling; what remains uncertain, however, is the strategy that will be most effective for any given segment of the population. In spite of programs that have proliferated in various forms, the epidemic does not appear to be abating. In 2007, 1.6 million new cases of diabetes were diagnosed among adults aged 20 years and older.⁸

Findings from a recent integrative literature review⁹ indicate that the practice of yoga is a promising adjuvant approach for diabetes management. The proposed physiologic mechanisms of yoga practice are reduction of sympathetic nervous system reactivity, with associated decreases in accumulated stress, and activation of the parasympathetic response through vagal nerve stimulation, with associated elevation of mood states and inhibition of negative neuroendocrine responses.¹⁰

Diabetes-related physiologic effects of yoga include significant improvements in fasting and postprandial blood glucose, hemoglobin A1c, total cholesterol and low-density lipoprotein, triglycerides, coronary stenosis, oxidative stress, blood pressure, body weight, waist/hip ratio, heart rate, catecholamine levels, and need for medication relative to baseline.¹⁰⁻¹⁴ Yoga practice likewise influences psychosocial markers, because of its emphasis on relaxation, enhanced self-awareness, and mindfulness. Specific mental health benefits include improvements in quality of life, depression, stress, anxiety, quality of sleep, self-esteem, and overall psychological well-being.¹⁵⁻²⁰

The long-term effects of yoga on individuals with diabetes remain unclear, which is a reflection of the lack of longitudinal research beyond 1 year postintervention. However, it is plausible that those who practice yoga over a longer period of time experience the cumulative effects of improved health status and health-related quality of life.²⁰ Yoga is reputed to affect all areas of life, whether practiced on a regular basis for health promotion or embraced as a way of life.^{21,22} Yoga practice has demonstrated a positive effect on flexibility, musculoskeletal stability, range of motion, and pain associated with musculoskeletal disorders.²¹⁻²⁴ A recent study among older adults living in Taiwan indicated that a yoga-based program had a positive effect on physical fitness.²⁵

Although documentation of the long-term effects of yoga practice is scarce, reports of the long-term effects of physical activity on those with diabetes are available. Societal benefits, including reduced health care costs and mortality rates, augment the multiple personal benefits.²⁶⁻²⁸ Diabetes-related benefits of physical activity include improvements in physiologic and clinical markers such as insulin resistance, glycemic control, hypertension, atherogenic dyslipidemia, fibrinolytic and endothelial function, oxidative stress, regulation of body weight, body fat percentage, and waist/hip ratio.²⁹⁻³⁵ Psychosocial benefits of physical activity among individuals with or at risk for type 2 diabetes include improvements in mental health outcomes such as anxiety, stress, self-esteem, self-efficacy, and quality of life.³⁶⁻³⁸

While the benefits of yoga for health promotion are promising, findings from a recent investigation indicate that typical beginner-level yoga practice is not of sufficient intensity to meet current physical activity recommendations for health and cardiovascular fitness.³⁹ Nonetheless, given the musculoskeletal benefits afforded by regular yoga practice, it is plausible that yoga may increase the capacity for physical activity, although no studies to date have tested this hypothesis. The National Center for Complementary and Alternative Medicine recently published a report highlighting the need for research that both examines the health behaviors of individuals who practice complementary and alternative therapies and explores avenues by which to foster health promotion in this distinct population.⁴⁰

Despite the proliferation of yoga-based studies in recent years, few have tracked participants over time. Whether study participants continue to practice yoga or reap any long-term benefits for diabetes management is largely unknown. The aim of this longitudinal study was to describe patterns of yoga practice and to examine differences in physical activity over time between individuals with or at risk for type 2 diabetes mellitus who completed an 8-week yoga-based intervention, compared with controls. Specific time points ranged from baseline to 15 months postintervention.

Methods

Participants and Design

The current study, consisting of a longitudinal comparative design, is an extension of 2 larger “parent” studies. The parent studies were 2 randomized, controlled trials, one for individuals with type 2 diabetes [Diabetes and Yoga Study (DAYS)] and the other for healthy women at risk for diabetes and cardiovascular disease [Women’s Health and Yoga Study (WHYS)].⁴¹ These trials held concurrent study enrollment and followed the same yoga intervention protocol. Participants for the DAYS and WHYS were recruited through advertisements posted in community newspapers, university buildings, community venues, and medical offices. These advertisements sought individuals who were interested in participating in a free yoga-based study.

Inclusion criteria for the 2 clinical trials were similar with some notable differences. Inclusion criteria common to both the DAYS and WHYS were age range (45 to 80 years old), postmenopausal status (for women), no yoga experience within the past 12 months, and the ability to complete an 8-week gentle yoga program. Exclusion criteria common to both studies were any major orthopedic or neurologic diagnoses, active joint or musculoskeletal pain, sleep apnea, and/or regular use of an assistive device.

To be included in the DAYS, 1 additional criterion was necessary: an established medical diagnosis of type 2 diabetes for at least 6 months. Individuals were excluded from participation in the DAYS if they took insulin, had any serious chronic comorbid conditions, experienced any acute coronary symptoms within the past 6 months, and/or had an artificial pacemaker.

To be included in the WHYS, a few more specific criteria were necessary: an inactive lifestyle (exercising less than 3 times per week) and having either overweight status ($\text{BMI} \geq 25$), visceral adiposity (waist circumference ≥ 88 cm) or a first-degree relative with diabetes or essential hypertension. Exclusion criteria specific to the WHYS were evidence of insulin sensitivity ($\text{QUICKI} > 0.357$), use of medications affecting carbohydrate metabolism, and/or any serious chronic conditions.

Human Subjects Protection

The University of Virginia Institutional Review Board for Health Sciences Research (IRB-HSR) approved the original study protocol, recruitment plans, and guidelines for ensuring the privacy and confidentiality of all participants. All protocol modifications for the current study received IRB-HSR approval as well. Written informed consent with approval for future contact was obtained before study enrollment.

Yoga Intervention

The DAYS and WHYS intervention protocol included 2 group sessions of supervised Iyengar yoga instruction per week, in addition to expected home practice, over an 8-week period. The specific style of yoga used in the current study is Iyengar yoga, known for its

gentle approach, focusing on body alignment, postures and breathing exercises that are easily tailored for beginners and modified for those with or at risk for chronic illnesses.^{42,43} In addition, Iyengar yoga includes the use of props such as blocks, belts, blankets, and chairs, all of which offer additional support for yoga positions to prevent strain or overstretching.²²

The yoga instructor had over 20 years of experience in Iyengar yoga and was a role model for participants because she began her study of yoga late in life. She played an active role in the development of homework assignments and the design of home-based resources, including a practice notebook and video in which she was featured.

Each group session began in the late afternoon or early evening and lasted for 90 minutes. Typically, the session began with brief discussion, during which participants shared any concerns with home practice. The instructor transitioned into the yoga session by leading participants in standard yoga relaxation and centering poses (*asanas*), followed by active yoga exercises designed for beginners. Focused yoga breathing exercises (*pranayama*) were incorporated throughout the session, particularly when participants were in seated or supine postures. Participants were supervised closely, with modifications of yoga postures recommended as necessary to minimize discomfort or prevent strain. The instructor encouraged the use of props to support positions that were difficult or uncomfortable for them. Toward the end of each session, the instructor led participants through a cool-down period, consisting of relaxation poses.

The control groups for each trial followed separate study protocols. The WHYS protocol specified an attention control group, in which participants met together twice weekly at the same time as the yoga intervention group. These individuals viewed a series of educational videos, followed by a brief facilitated discussion, throughout the duration of the study.⁴⁴ In addition, the research team requested that WHYS control participants refrain from making purposeful lifestyle changes throughout the duration of the intervention. The DAYS protocol specified a usual care group, in which participants completed a weekly postprandial blood glucose monitoring log and otherwise maintained their normal plan of care during the study period. Upon study completion, control participants were offered coupons for free yoga sessions at a local Iyengar yoga studio.

Data Collection

Following on-site consent and enrollment, participants eligible for the DAYS and WHYS completed demographic forms, multiple surveys, and physiologic measurements. Participants were randomized, and the studies commenced. At the end of the 8-week intervention period, participants in the parent studies completed the same evaluations that they had done at baseline. Participants who had agreed to future contact on their signed consent forms were mailed follow-up questionnaires at 3, 6, and 15 months postintervention.

The current study was composed of a subgroup of participants from the first 2 cohorts of DAYS and WHYS, those who consented to future contact and completed follow-up assessments at 3, 6, and 15 months postintervention. The first 2 cohorts of the DAYS and WHYS consisted of 94 participants, but only 80 individuals completed the parent studies and consented to future contact. Reasons for attrition included schedule conflicts/competing obligations ($n = 3$), health problems ($n = 4$), abnormal laboratory values ($n = 2$), distance ($n = 1$), or unknown reasons ($n = 4$). All 80 participants were mailed follow-up assessments at 3 and 6 months postintervention. At 15 months postintervention, 78 of 80 participants (one did not speak/write English and another was lost to follow-up at the time) were mailed follow-up assessments.

Measures

Demographics—Each participant completed basic demographic forms, containing data such as age, gender, marital status, race/ethnicity, education, and employment. Additional background and health history data were collected and reported elsewhere.⁴¹

Yoga Practice—Yoga practice was measured using a brief follow-up questionnaire designed by the research team. Dichotomous responses (yes/no) were elicited regarding current yoga practice. The study protocol consisted of 8 weeks of yoga instruction; thus, the purpose of the follow-up questionnaire was to assess the extent to which participants continued to practice yoga on their own following the completion of the study.

Physical Activity—Physical activity was assessed using the Physical Activity Scale for the Elderly (PASE), a measure consisting of 10 primary questions, subdivided into additional questions, for a maximum of 26 questions.⁴⁵ PASE questions were designed to assess the physical activity patterns of older adults in particular, with a focus on 3 broad types of activity: leisure time (recreational) activity, household activity, and work-related activity.

PASE questionnaires were administered at baseline, and again at 3, 6, and 15 months following the completion of the study. The composite PASE score was calculated according to the algorithm for weighting and summation as described in the scoring manual.⁴⁶ According to instrument developers, the recommended procedure for scoring missing items was to record the response measure of central tendency in the sample in place of the missing item.

Data Analysis

Data entry and analysis were conducted using the Statistical Package for the Social Sciences (SPSS) data analysis program, version 18.0.⁴⁷ Basic data screening and cleaning procedures were done to minimize errors in data entry. Missing values analyses were performed to identify any patterns. Because of the nature of this pilot study, the level of significance was set at $\alpha = .05$, and P -values up to 0.07 were examined.

Descriptive statistics were calculated on demographic variables, physical activity, and yoga practice. Because of the relative homogeneity in some of the demographic variables of the sample, race/ethnicity, marital status, education, and employment were recoded for these analyses as Caucasian (nonminority) = 0, minority = 1; not currently married = 0, currently married = 1; fewer than 4 years of college = 0, 4 years of college or more = 1; and currently not working = 0, currently working = 1. Based on the literature, these demographic variables were considered potential covariates. The relationships between demographic variables and physical activity at each time point were evaluated using the Pearson product-moment correlation coefficient for continuous variables; for categorical variables, Kendall's tau-b coefficient was used. The detection of statistically significant associations of moderate or greater strength ($r \geq .3$) was used as one determination of whether covariates were included in statistical analysis; the other determination for the use of covariates was the evaluation of statistically significant differences in demographic characteristics between responders and nonresponders.

Baseline differences in demographics and physical activity levels between the intervention and control groups were assessed using independent t tests for continuous variables (age and physical activity) and Chi square tests for categorical variables (gender and dichotomized marital status, race/ethnicity, education, and employment). Before evaluating baseline differences, the assumptions of univariate normality and homogeneity of variance were met,

using Fisher's test of skewness and Levene's test, respectively. Statistically significant differences in any of these variables between the yoga intervention and control groups necessitated the inclusion of covariates in statistical analysis.

Multilevel models (MLM) were used to analyze the longitudinal physical activity data. Random intercept growth models were used to define the longitudinal time-related change in physical activity. The advantages of MLM include the ability to handle some missing data and unequally spaced observations. The SPSS Linear MLM module was used for these analyses. The dependent variable for all models was the PASE score, or self-reported physical activity. The first model included time (linear trajectory), group (yoga versus control), and the interaction of time by group. Given the long-term follow-up at 6 and 15 months postintervention, a linear trajectory may not be sufficient because it would be likely that physical activity may decline in the postintervention period. Thus, the first model also included time² (quadratic trajectory) to explore the possible nonlinear longitudinal change in PASE over the course of study. The second model added selected demographic covariates to the first model to determine if these improved the model fit. The variables in the second model were time, time², group (yoga versus control), time by group, age, and education. The referent category for group was the control group and for education, the fewer than 4 years of college category. Age was centered (accomplished by subtracting the mean age from each participant's age). Centering age makes it possible to interpret the MLM intercept as the baseline mean PASE score for a control participant of average age. The unstructured covariance structure was used in all models. The Akaike's Information Criterion (AIC) was used to determine the best model fit between the first and second models. Smaller AIC values indicates a better fitting model, and if the AIC is significantly lower with the addition of variables, these variables should be retained in the model.

Results

Sample Demographics

At 3 months postintervention, 59 of 80 participants completed questionnaires, for a response rate of 74%. At 6 months postintervention, 60 of 80 participants completed questionnaires, for a response rate of 75%. At 15 months postintervention, 63 of 78 completed questionnaires, for a response rate of 81%.

Differences in respondents and nonrespondents were assessed, based on participant response to the final follow-up assessment at 15 months postintervention (See Table 1). Between the 63 respondents and the 15 nonrespondents, there were statistically significant differences in age [$t(92) = 2.514, P = .014$] and education [$\chi^2(1) = 12.851, P < .001$] with nonrespondents being younger and having fewer years of formal education than respondents. However, there were no statistically significant differences in baseline physical activity scores between respondents and nonrespondents.

Demographic characteristics of the DAYS and WHYS participants included in the follow-up assessments ($n = 78$) are presented in Table 2, organized by treatment group. There were no statistically significant differences in demographic characteristics or baseline physical activity scores based on treatment group.

Yoga Practice

The frequency and percentage of participants who reported yoga practice at each follow-up assessment are presented in Table 3, organized by treatment group. Analysis of the reported postintervention yoga practice between groups over time revealed a widely disparate pattern. At 3 months postintervention, more than half of the yoga intervention respondents (18 of 33) reported continued yoga practice, while only 14% of the controls (3 of 22) reported having

begun yoga practice after the 8-week intervention period had ended. At 6 months postintervention, the percentage of yoga intervention respondents who were practicing yoga had diminished to 34% (11 of 32). However, the controls who had begun to practice yoga at 3 months postintervention did not show a similar decrease, with 13% of control respondents (3 of 23) continuing to practice yoga at 6 months. At 15 months postintervention, only 14% of yoga intervention respondents (5 of 36) reported continued yoga practice, while a surprisingly high 22% of control respondents (6 of 27) reported yoga practice, increased from 3 and 6 months postintervention.

Physical Activity

None of the demographic variables were significantly related with PASE scores at any time point (for age, r ranged from 0.059 to 0.184; for gender, Kendall's tau-b ranged from -0.022 to -0.118 ; for marital status, Kendall's tau-b ranged from 0.032 to 0.206; for race/ethnicity, Kendall's tau-b ranged from -0.015 to 0.091; for education, Kendall's tau-b ranged from 0.049 to -0.162 ; and for employment, Kendall's tau-b ranged from .031 to .199). Therefore, none of the demographic variables were included as covariates in the initial analysis of physical activity over time.

Two MLMs were estimated. In the first MLM (see Table 4), estimates of the intercept, time (linear trajectory), and time² (quadratic trajectory) were statistically significant, but the interaction of time by group was not. The intercept estimate of 152.3 indicated that the baseline mean PASE was 152.3 for a person in the control group of average age. The group estimate, -18.3 , indicated that a participant in the yoga group of average age had a mean of 18.3 points less on the PASE at baseline than the controls. The linear time slope of 35.5 indicated that the PASE scores increased an average of 35.5 points at each time point. However, a linear slope is not sufficient to explain every participants' trajectory over the course of the study, thus the examination of the quadratic trajectory, time². The time² estimate of -10.1 indicated that the rate of change in physical activity declined over the postintervention follow-up assessments.

The second model added age (centered) and education to the previous model to determine if these demographic characteristics assist in predicting PASE scores, thus improving the model fit. Although age and education were not individually significant predictors, adding these 2 demographic variables significantly decreased the AIC, thus indicating a better fitting model and indicating that these added variables should be retained in the model. The intercept estimate indicated that the baseline mean PASE was 143.4 for a person in the control group of average age. The group estimate indicated that a participant in the yoga group of average age had a mean of 16.4 points less on the PASE at baseline than the controls. The linear time slope indicated that the PASE scores increased an average of 36.7 points. Time² estimate indicated that the rate of change in physical activity declined over the postintervention follow-up assessments to about the same extent as in the first model.

Overall, these models indicate that physical activity of some participants did increase over time, but physical activity showed a decline in the follow-up assessments of other participants. Group did not have a significant influence in the rate of change in physical activity over the study period. While age and education were not significant individual predictors, the inclusion of these variables in the model did improve fit.

Discussion

Yoga practice decreased significantly over time in the yoga intervention group, falling from 54% of respondents to 14% of respondents over the span of 1 year (from 3 to 15 months postintervention). It is possible that without the reinforcement and social support of the

group yoga format, participants gradually lost interest and motivation to continue a personal yoga practice, a finding that emerged from interviews with intervention participants.⁴⁸

A phenomenon of interest occurred in the control group: yoga practice over time slightly increased, rising from 14% of respondents to 22% of respondents over the same year period. This outcome is surprising, given that the intervention participants engaged in an intensive yoga program (16 class sessions tailored to the needs of an older population with or at risk for type 2 diabetes), compared with the concurrent experience of control participants (educational videos or usual care, with coupons for 6 free sessions at a local yoga studio issued upon study completion).

One potential explanation for these unexpected results is the crude measurement of yoga practice used in the analysis. The dichotomous response limited the validity of the findings, because there was too much room for interpretation on the part of respondents. Control respondents may have been inclined to report practicing yoga in qualitatively different manner than the yoga intervention participants, because controls were not exposed to yoga during the study and only received coupons for 6 free yoga sessions after the study ended. In fact, the definition of yoga practice varied widely among participants, a finding that emerged from analysis of interviews with yoga intervention participants.⁴⁸ When asked during these interviews to describe their experience with yoga more than a year after completing the study, participants in the yoga group were hesitant to say that they maintained a yoga practice, although they described integrating elements of yoga practice into their daily lives.⁴⁸

Another potential explanation for these findings is that 8 weeks of yoga instruction is simply not enough for participants to continue yoga practice on their own. Anecdotally, participants expressed the opinion that they were just beginning to feel confident in their practice of yoga toward the end of the 8-week timeframe, indicating that an intervention of longer duration may foster the maintenance of yoga practice for a longer period of time following intensive instruction.

Results from statistical analysis revealed that physical activity patterns over time were not influenced by treatment group. Essentially, there was no significant difference in physical activity over time between the intervention and control groups, a parallel finding to that of yoga practice. One potential explanation for this finding is that the PASE questionnaire was not an appropriate measure for use in the current study, a possibility discussed at length in the study limitations. Another potential explanation for this finding is that intervention and control participants alike were highly motivated to participate in the trials and eager to make improvements in their health, including physical activity.

Although treatment group did not influence the rate of change in physical activity over time, understanding the effect of the WHYS control group protocol (educational videos followed by brief, facilitated discussion) is clinically important, particularly given the protocol feasibility and acceptability to participants.⁴⁴ Participants were highly motivated to change, and the substance of the educational videos was interesting and provided extensive information on women's health and positive lifestyle change.⁴⁴ It is plausible that the WHYS controls made changes in physical activity over time, based on health information presented in the videos.

Study Limitations

The complexity of the response set for the PASE questionnaire may have led to participant error in the estimation of recent physical activity. In addition, the prompts for each PASE item describe representative activities, none of which included yoga, which may have

contributed to under-reporting of yoga and by extension, physical activity. Because of the omission of yoga as a representative physical activity on the PASE, participants freely interpreted how best to record their practice of yoga. Some participants classified yoga as a moderate sport and recreational activity, but most categorized it as an exercise to increase muscle strength and endurance. Because all PASE items are weighted before scoring, and these 2 classifications of activity have considerable weight differences, such subjectivity may have affected the accuracy of physical activity scores.

A team of researchers developed and validated the PASE in an older sample that was less active than the sample in this study.⁴⁵ When investigating construct validity using a sample more similar to that of the current study, developers indicated that the PASE did not perform as well in adults younger than 65 years of age, because of the relatively higher levels of physical activity and employment found in younger samples.⁴⁹ In future studies among adults who are younger than 65 years old, another instrument to assess physical activity may be more appropriate.

Another limitation of the current study design is the potential influence of self-report bias, given that follow-up assessments consisted exclusively of questionnaire data, which are highly subject to individual memory and interpretation and therefore may not be an accurate reflection of reality. Social desirability bias may also play an important role, particularly since the study questionnaires elicited information about health behavior related to physical activity levels from highly educated individuals who had participated in a study designed to promote their health. The use of objective measures, including pedometers, may provide a more accurate account of physical activity over time.

Selection bias limits the generalizability of the study, because convenience sampling resulted in a sample of volunteer participants who were probably different from the general population—they may in fact be more concerned about their health, more motivated to make lifestyle changes, and more compliant than nonparticipants. Nonrespondent bias is another limitation of this longitudinal study; the response rates at each follow-up assessment were high, ranging from 74% to 81%, but statistically significant demographic differences in age and education were detected between those who completed all follow-up assessments and those who did not. These differences underscore the need for thorough follow-up procedures at each assessment to foster optimal follow-up response and to ensure that data are not missing, thereby protecting against bias and assuring adequate variability of the sample throughout the course of the study.

Conclusions

There was no evidence in the current study that an 8-week yoga intervention in older adults led to increased physical activity over time. Although there were no statistically significant differences in physical activity over time between the yoga intervention and control groups, further research is necessary to determine the long-term effect of yoga practice on physical activity among individuals with or at risk for type 2 diabetes. Moreover, future research is necessary to clarify the influence of yoga on a variety of behavioral health outcomes associated with type 2 diabetes. Given the national imperatives for preventing and managing chronic diseases such as type 2 diabetes, scientists with a health promotion program of research must integrate strategies for maintenance of the intervention over time to optimize the translation of study findings to practice and thereby improve the public's health.⁵⁰

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Table 1

Comparison of Sample Characteristics for Respondents and Nonrespondents

	Respondents	Nonrespondents	Group difference (<i>P</i> -value)
N	63	15	
Age			
Mean (SD)	60.5 (7.1)	55.3 (5.2)	.010
Gender			
Female	55 (87.3%)	14 (93.3%)	.511
Male	8 (12.7%)	1 (6.7%)	
Marital status			
Not currently married	27 (42.9%)	7 (46.7%)	.789
Currently married	36 (57.1%)	8 (53.3%)	
Race/ethnicity			
Caucasian (nonminority)	52 (82.5%)	10 (66.7%)	.171
Minority	11 (17.5%)	5 (33.3%)	
Education			
Fewer than 4 years of college	14 (22.2%)	11 (73.3%)	<.001
4 years of college or more	49 (77.8%)	4 (26.7%)	
Employment			
Not currently working	24 (38.1%)	2 (13.3%)	.067
Currently working	39 (61.9%)	13 (86.7%)	
Baseline physical activity			
Mean (SD)	134.3 (71.4)	168.5 (114.8)	.285

Table 2

Sample Characteristics, n = 78

	Yoga	Control	Group difference (<i>P</i> -value)
N	39	39	
Age			
Mean (SD)	59.0 (6.7)	60.1 (7.4)	.493
Gender			
Female	35 (89.7%)	34 (87.2%)	.723
Male	4 (10.3%)	5 (12.8%)	
Marital status			
Not currently married	16 (41.0%)	18 (46.2%)	.648
Currently married	23 (59.0%)	21 (53.8%)	
Race/ethnicity			
Caucasian (nonminority)	30 (76.9%)	32 (82.1%)	.575
Minority	9 (23.1%)	7 (17.9%)	
Education			
Fewer than 4 years of college	10 (25.6%)	15 (38.5%)	.225
4 years of college or more	29 (74.4%)	24 (61.5%)	
Employment			
Not currently working	15 (38.5%)	11 (28.2%)	.337
Currently working	24 (61.5%)	28 (71.8%)	
Baseline physical activity			
Mean (SD)	129.3 (71.7)	152.4 (90.2)	.215

Table 3

Self-Reported Yoga Practice Over Time

	Study onset	3 months postintervention *	6 months postintervention **	15 months postintervention ***
Intervention, n (%)	39 (100%)	18 (54%)	11 (34%)	5 (14%)
Control, n (%)	0	3 (14%)	3 (13%)	6 (22%)

* 33 yoga intervention respondents, 22 control respondents.

** 32 yoga intervention respondents, 23 control respondents.

*** 36 yoga intervention respondents, 27 control respondents.

Table 4

Multilevel Model Estimates

Variable	Model 1			Model 2		
	Estimate	SE	CI	Estimate	SE	CI
Intercept	152.3*	12.8	(126.8, 177.8)	143.4*	14.3	(114.9, 172.0)
Time	35.5*	10.8	(14.2, 56.9)	36.7*	10.8	(15.4, 58.0)
Time ²	-10.1*	3.3	(-16.5, -3.6)	-10.1*	3.3	(-16.6, -3.7)
Group	-18.3	17.8	(-53.7, 17.2)	-16.4	18.0	(-52.2, 19.5)
Time by group	1.2	6.9	(-12.6, 15.1)	0.58	6.9	(-13.1, 14.3)
Age (centered)				-0.78	1.1	(-3.0, 1.4)
Education				24.8	16.7	(-8.6, 58.1)
AIC value	2784.8			2772.6		