

Effect of Certified Personal Trainer Services on Stage of Exercise Behavior and Exercise Mediators in Female College Students

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Abstract. Objective: The authors examined the effect of certified personal trainer services on exercise behavior by using the transtheoretical model of behavioral change. **Participants:** Female college students ($n = 449$) completed surveys during the first week (T1) and last week (T2) of the fall semester. **Methods:** Students receiving personal trainer services during the fall semester (experimental group, $n = 31$) were cross-matched with students who had not received services (control group, $n = 31$). **Results:** The control group demonstrated a statistically significant regression in stage of exercise change scores; the experimental group did not. The authors found the 2 groups to have a statistically significant difference in the pattern of exercise behavior change over the course of the semester, with more active maintainers and progressors in the experimental group. **Conclusions:** Cognitive and behavioral processes of change, decisional balance, and scheduling self-efficacy significantly decreased in the control group, whereas cognitive processes of change, decisional balance, and scheduling self-efficacy remained statistically unchanged in the experimental group.

Keywords: exercise behavior, gender, health education

Physical inactivity is a risk factor associated with several disease processes, including cardiovascular disease, colon cancer, and type 2 diabetes.¹ In contrast, regular physical activity has several benefits, including enhancing psychological well-being, assisting in the maintenance of ideal body weight, and preventing premature death.¹ Despite the strong evidence for the health-promoting benefits of engaging in regular physical activity, participation rates have been shown to decrease over the life span,² with the steepest decline in physical activity occurring in adolescence and young adulthood.^{3,4} Furthermore,

the problem of inactivity appears to be greater for females, as they tend to be less active than males.^{1,5}

Several researchers have used the transtheoretical model (TTM)⁶ to examine and understand exercise behavior⁷⁻⁹ and change in exercise behavior^{9,10} in college students. The primary constructs of TTM are stages of change, processes of change, decisional balance, and self-efficacy.⁶ The stages of change represent the temporal dimension of behavioral change, with individuals moving nonlinearly through the stages. The 5 stages, which are defined by past experience or the intention to change, include precontemplation (not intending to change behavior), contemplation (considering a change in the next 6 months), preparation (making small changes), action (being engaged in criterion behavior for less than 6 months), and maintenance (having maintained criterion behavior for longer than 6 months).⁶

The processes of change (POCs) describe how people change. The processes are overt and covert strategies that people use to change behavior.¹¹ Using the TTM, Marcus et al¹² developed a questionnaire to measure the POCs as they pertain to exercise behavior. The authors found that the 10 processes are grouped into 2 higher-order factors representing cognitive strategies and behavioral strategies. With exercise, the cognitive POCs peak in the action stage, whereas the behavioral processes increase from the preparation to the action stage and then level off.^{13,14} It is believed that the 5 cognitive POCs are most effective in increasing readiness to change when applied to people who are not ready to change. The 5 behavioral POCs are believed to be most relevant to individuals who are ready to change or to assist those who have changed in maintaining the criterion behavior.¹¹

Decisional balance and self-efficacy describe why people change. *Decisional balance* refers to the perceived benefits (pros) and costs (cons) of engaging in a particular behavior.¹⁵ The greater the perceived benefits and fewer the

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perceived costs, the more likely the person is to engage in the activity.¹⁵ In general, progression through the stages is associated with an increase in the pros and a decrease in the cons until the pros eventually outweigh the cons in either the contemplation or preparation stage.¹⁶ *Self-efficacy* is the judgment that one has the capability to perform a behavior that will result in the desired outcome.^{17,18} General exercise self-efficacy has been shown to increase with progression through the stages of exercise change.^{13,19} Coping, scheduling, and task self-efficacies have been shown to contribute independently in distinguishing between individuals who exercise more or less than 3 times per week.²⁰

Colleges and universities are important settings for reducing young adults' health-risk behaviors, such as physical inactivity.²¹ Several researchers have examined interventions used to facilitate improved exercise behavior in college students. These studies involved the use of mail-delivered brochures designed to promote exercise-facility use by sedentary students,²² a classroom- and lab-based course required for graduation,²³ and a broad-based approach to creating a so-called health-promoting university.²⁴ The effectiveness of these interventions has been mixed; Cardinal et al²³ reported a significant improvement in the students' stage of exercise change, whereas Xiangyang et al²⁴ and Woods et al²² reported the intervention to be ineffective in the participant group in comparison with the control group.

Another way some colleges and universities promote physical activity is by providing exercise trainers, such as certified personal trainers, to assist students in developing and safely engaging in exercise programs and to educate students on the benefits of engaging in regular exercise. However, to our knowledge, the efficacy of this nonclassroom-based intervention strategy with young adults has not been studied. Therefore, our purpose in this study was to determine the effectiveness of certified personal trainer services in promoting exercise adherence in female traditional-aged college students. We hypothesized that (1) the group receiving the certified personal trainer services would report a more positive pattern of exercise behavior than would the control group; (2) the scores related to the mediators of exercise behavior change, including cognitive and behavioral POCs, decisional balance, and coping, scheduling, and task self-efficacies, would decrease in the control group; and (3) the scores related to the mediators of exercise behavior change would increase in the group receiving the personal trainer services over the course of the fall semester.

METHODS

We used a prospective pretest–posttest quasiexperimental design to assess the effect of certified personal services on the number of students exercising at or above a criterion level at the beginning of the fall semester compared with the end of the fall semester. In addition, we assessed changes in cognitive and behavioral POCs, decisional balance, and coping, scheduling, and task self-efficacies, which are believed to mediate exercise behavior.

Participants

The college's institutional review board granted permission to conduct this study. We e-mailed a letter describing the study and a link to the initial research questionnaire to all 2,024 college students who were enrolled in courses during the first week of the fall 2004 semester (T1) at a private, midwestern, all-women's college. During the 1-week data-collection period, we sent 3 follow-up e-mails with links to the questionnaire to remind the students of the opportunity to participate in the study. We considered submission of the survey to be consent approval for participation in the study. The T1 survey took approximately 15 to 20 min to complete. In the end, 708 students (35%) submitted responses electronically. We sent a follow-up letter and link to the follow-up questionnaire to those 708 students 2 weeks prior to the start of final exams for the fall semester (T2). Again, we sent 3 follow-up e-mails with links to the questionnaire during the 1-week T2 data-collection period to remind the students of the opportunity to participate in the study. This survey was identical to the T1 survey except it did not include questions pertaining to demographic information and did include questions pertaining to whether the student had received certified personal trainer services over the course of that fall semester. The T2 survey also took approximately 15 to 20 min to complete.

There were 92 days between the start of the T1 and T2 data-collection periods. We provided incentive by entering students who submitted the T1 survey into a drawing for a \$100 cash prize. We held a second \$100 cash prize drawing for the students who submitted the T2 survey. A total of 449 students (63.4%) submitted responses to the follow-up questionnaire.

Because the intent of this study was to examine the effect that certified personal trainer services had on stage of exercise change and mediators of exercise behavior change, we did not include students involved in fall or winter intercollegiate or club sports in the study. From the 312 not-in-season student-athlete responses, we created a stratified random sample to cross-match the experimental group (ie, the students who received the personal trainer services on campus, $n = 31$) and a control group (ie, the students who did not receive personal trainer services, $n = 31$) primarily for T1 stage of exercise change and secondarily for year in school and smoking status (see Table 1). Perfect cross-matching for these characteristics was not possible because a limited number of students in the control group were in the precontemplation stage of exercise change and because all students in the control group reported smoking status.

Certified Personal Trainer Services

All students enrolled in courses at the college were eligible to receive the certified personal trainer services at no cost to them. The services were provided by 2 female students certified as personal trainers; both had 2 years of personal trainer experience and were college employees. We did not assess the stage of exercise change and, therefore, did not intentionally apply a stage-specific approach

TABLE 1. Frequencies of Participant Demographics

Characteristic	Experimental group ^a	Control group ^a
Year in school		
First	13	12
Second	5	5
Third	3	4
Fourth	10	10
Housing		
On campus	24	27
Off campus	7	4
Smoker		
Yes	0	0
No	29	31
Did not answer	2	0
Stage of change		
Precontemplation	1	1
Contemplation	1	1
Preparation	4	4
Action	7	7
Maintenance	18	18

^a*n* = 31.

to exercise behavior modification. However, we did adapt the services provided by the personal trainers to participants' exercise goals. The personal trainers conducted both individual and small-group (2 or 3 students) consultation sessions on the basis of the student's request.

Instruments

Stage of Exercise Change

We used the Stage of Exercise Change scale.²⁵ Students identified themselves as being in 1 of 5 stages of exercise behavior change (precontemplation, contemplation, preparation, action, or maintenance) that described their current exercise behavior and their intent to initiate exercise in the next 6 months (see Table 2). This scale measures the frequency and duration of exercise and does not assess vigorous and moderate physical activity separately. *Exercise* was defined as "activity that is planned, structured, involves

repetitive movement of the body, and is designed to maintain or improve physical fitness." The criterion amount of exercise (3 or more times per week for at least 20 minutes at a time) is consistent with previous research in this area.^{7,15,20,26-30} Reliability of the stage of exercise change measure has been shown to have a kappa index reliability of .78 over a 2-week period. Concurrent validity with the 7-Day Physical Activity Recall Instrument³⁰ and with measures of fitness^{31,32} has been demonstrated.

Processes of Change

The Processes of Change Questionnaire³³ consists of 40 items, which we used to determine the processes used by students to change their thinking about exercise and their exercise behavior. Students rated how frequently they used each of the processes during the past month on a 5-point Likert-type scale. The internal consistency of the scale ranged from .62 to .89.³³ The scale also has 2 higher-order factors representing cognitive strategies and behavioral POCs.³³ We assessed the cognitive and behavioral POCs separately in this study. A minimum score of 20 and a maximum score of 100 was possible for each of the 2 measures. Dunn et al³⁴ demonstrated that changes in POC scores correlate well with actual exercise behavior.

Decisional Balance

The Decisional Balance Questionnaire¹⁵ measures the perceived benefits of and barriers to physical activity. It consists of 16 items, 10 for exercise and 6 against exercise. Participants rate each item on a 5-point Likert-type scale on its importance in the decision-making process of whether to be physically active. We determined the decisional balance score by subtracting the average cons score from the average pros score; a minimum score of -4 and a maximum score of 4 were possible.¹¹ The higher the score, the more beneficial exercise is perceived to be. Internal consistency for the 10-item pro scale and the 6-item con scale was .70 and .56, respectively.²⁰

Self-Efficacy

We measured 3 types of self-efficacy in this study: task, coping, and scheduling. Research findings have

TABLE 2. Five Stages of Exercise Behavior Change

Stage	Definition
Precontemplation	I currently do not exercise, and I do not plan to start exercising in the next 6 months.
Contemplation	I currently do not exercise, but I do plan to start exercising in the next 6 months.
Preparation	I currently exercise, but not 3 or more times per week for at least 20 minutes at a time.
Action	I currently exercise 3 or more times per week for at least 20 minutes at a time, but I have only begun doing so in the past 6 months.
Maintenance	I currently exercise 3 or more times per week for at least 20 minutes at a time, and I have done so for longer than 6 months.

demonstrated that these 3 types of self-efficacy contribute independently in distinguishing individuals who exercise more or less than 3 times per week.²⁰ We measured all self-efficacy items by using an 11-point Likert-type scale ranging from 0 (*no confidence*) to 10 (*complete confidence*). This range of response options is consistent with the recommendation of Bandura^{17,18} and other researchers assessing self-efficacy with respect to exercise behavior.^{20,35,36} We determined an average score for each of the 3 types of self-efficacy; a minimum score of 0 and a maximum score of 10 were possible. Each set of items specific to the type of self-efficacy was grouped separately and preceded by an introductory stem, such as “How confident are you that you. . . .” We measured task self-efficacy by using 4 items: “can pace yourself during the activity to avoid overexertion,” “can follow instructions from an instructor,” “can perform required movements,” and “can check how hard the activity is making you work.”²⁰ We measured coping self-efficacy by using 3 items: “can exercise when you are tired,” “can exercise when you are in a bad mood,” and “can exercise when you do not feel you have the time.”²⁰ We measured scheduling self-efficacy by using 3 items: “can arrange your schedule to exercise no matter what,” “can overcome obstacles that prevent you from exercising regularly,” and “can make up times when you have missed your regular exercise session.”²⁰ Internal consistency was .72, .88, and .76 for coping, scheduling, and task self-efficacy, respectively.²⁰

Statistical Analysis

We analyzed the data with SPSS 12.0 for Windows (SPSS Inc, Chicago, IL). We used descriptive statistics to summarize demographic information. We used descriptive statistics and an independent-samples *t* test to compare the T1 cognitive and behavioral POCs, decisional balance, and coping, scheduling, and task self-efficacy data of the experimental and control groups. We determined the reliability of the cognitive and behavioral POCs, decisional balance, and coping, scheduling, and task self-efficacy measures by using the Cronbach alpha.

In an intragroup analysis of T1 and T2 cognitive and behavioral POCs, decisional balance, and coping, scheduling, and task self-efficacy data, we used descriptive statis-

tics and a paired-samples *t* test. In an intragroup analysis of T1 and T2 stage of exercise behavior change, we used a Friedman analysis of variance (ANOVA) by ranks.

To compare the number of students exercising at or above the criterion level at T1 and T2, we grouped students into 1 of 4 distinct patterns of exercise change categories on the basis of their T1 and T2 stage of exercise change scores (see Table 3). This method of analyzing exercise adherence is consistent with previous research.^{37–39} We used a chi-square analysis to compare the difference between the experimental group's and the control group's pattern of exercise change classification.

RESULTS

Comparison of Groups at T1

Using an independent-samples two-tailed *t* test, we compared the mean T1 cognitive POC, the behavioral POC, decisional balance, and coping, scheduling, and task self-efficacy scores for the control group with those of the experimental group. This test revealed no statistically significant difference at $\alpha = .05$ between the groups: cognitive POC ($t[60] = 1.292, p = .201$), behavioral POC ($t[60] = 0.163, p = .871$), decisional balance ($t[60] = -1.696, p = .095$), coping self-efficacy ($t[60] = -0.310, p = .757$), scheduling self-efficacy ($t[60] = -0.465, p = .644$), and task self-efficacy ($t[60] = -0.486, p = .629$).

Reliability of Measures

We used the Cronbach alpha to determine the reliability of questionnaires used in this study. The reliability of the measure for cognitive POC ranged from .811 to .901; behavioral POC from .794 to .897; decisional balance pros from .861 to .926 and cons from .724 to .878; and self-efficacy coping from .757 to .862, scheduling from .871 to .959, and task from .639 to .788.

Within-Group Comparison of Stage of Exercise Change From T1 to T2

We applied a Friedman ANOVA by ranks to the T1 and T2 stage of exercise change (5 ranked stages) for both the experimental and the control groups ($\alpha = .05$; see Table 4). We did not find the resulting chi-square value for the experimental group to be statistically significant at $\alpha = .05$ ($\chi^2[1, N = 31] = 1.0, p = .317$). We did find the resulting chi-square value for the control group to be statistically significant at $\alpha = .05$ ($\chi^2[1, N = 31] = 14.0, p < .001$).

TABLE 3. Criteria for Placement Into 1 of 4 Patterns of Exercise Behavior Change Categories

Baseline stage	Follow-up stage	Category
Precontemplation, contemplation, or preparation	Precontemplation, contemplation, or preparation	Sedentary maintainer
Precontemplation, contemplation, or preparation	Action or maintenance	Progressor
Action or maintenance	Action or maintenance	Active maintainer
Action or maintenance	Precontemplation, contemplation, or preparation	Regressor

TABLE 4. Change in Stage of Exercise Change Classification From T1 to T2, by Group

Group	T1	T2
Experimental group		
Precontemplation	1	0
Contemplation	1	1
Preparation	4	5
Action	7	12
Maintenance	18	13
Total	31	31
Control group		
Precontemplation	1	1
Contemplation	1	7
Preparation	4	8
Action	7	2
Maintenance	18	13
Total	31	31

Pattern of Exercise Behavior Change

Using the classification scheme described in Table 1, we used the T1 and T2 stages of exercise behavior change (see Table 4) to place the students into 1 of 4 patterns of exercise behavior change categories (see Table 5). An examination of the data showed fewer regressors and sedentary maintainers and more active maintainers and progressors in the experimental group than in the control group at the end of the fall semester. We applied a chi-square test to compare the pattern of exercise behavior change of the control group with that of the experimental group, which we found to be statistically significant at $\alpha = .05$ ($\chi^2[3, N = 62] = 7.849$, $p = .028$). Using the contingency coefficient, we found the strength of the relationship to be .358.

Within-Group Comparison of Exercise Mediators at T1 and T2

A paired-samples t test compared the mean scores of cognitive and behavioral POCs, decisional balance, and coping, scheduling, and task self-efficacies at T1 with the mean scores at T2 for each of the groups. In regard to the control group, this test showed a statistically significant decrease at $\alpha = .05$ for cognitive POC ($t[30] = 2.963$, $p = .006$), behavioral POC, ($t[30] = 4.497$, $p < .001$), decisional balance ($t[30] = 3.350$, $p = .002$), and scheduling self-efficacy, $t(30) = 3.157$, $p = .004$. There was no statistically significant decrease in task self-efficacy ($t[30] = 0.173$, $p = .863$) or coping self-

efficacy ($t[30] = 1.966$, $p = .059$), over the course of the fall semester in the control group.

The experimental group showed a statistically significant decrease in only behavioral POC ($t[30] = 2.367$, $p = .025$); however, there was no statistically significant decrease in cognitive POC ($t[30] = 1.099$, $p = .281$), decisional balance ($t[30] = 0.747$, $p = .461$), coping self-efficacy ($t[30] = 1.169$, $p = .252$), scheduling self-efficacy ($t[30] = 1.496$, $p = .145$), or task self-efficacy ($t[30] = 0.758$, $p = .454$; see Table 6).

COMMENT

The data supported our first hypothesis—that the group receiving the certified personal trainer services would report a significantly more positive pattern of exercise behavior than would the control group. At T1, both the control group and the experimental group included 25 students (80.6%) who reported exercising at or above the criterion level of 3 times per week for 20 minutes. At T2, the control group included 15 students (48.4%) classified as active maintainers (maintained the criterion exercise pattern from T1 to T2), whereas the experimental group included 22 students who were classified as active maintainers and 3 who were classified as progressors (adopted the criterion exercise pattern at some point during the semester), for a total of 25 students (80.6%). We found this difference in the pattern of exercise behavior change to be significantly more positive in the experimental group than in the control group.

The data partially supported the second hypothesis—that the scores related to the mediator of exercise behavior change would decrease over the course of the semester in the control group. We observed a significant decrease in the cognitive and behavioral POCs, decisional balance, and scheduling self-efficacy, but we did not find the decreases in coping or task self-efficacy to be significant. The findings related to cognitive and behavioral POCs and decisional balance, coupled with the general negative trend in the pattern of exercise behavior change in the control group, are consistent with previous research findings. The use of cognitive POCs has been shown to progressively decrease in stages below the action stage, whereas the use of behavioral POCs decreases with regression from the maintenance stage of change.⁸ A significant relationship between stage of change and decisional balance with scores decreasing (becoming less positive) or regression in the stages has been demonstrated in adolescents¹³ and adult workers.⁴⁰

TABLE 5. Pattern of Exercise Behavior Change Classification

Category	Experimental	Control	Total
Sedentary maintainer	3	6	9
Progressor	3	0	3
Active maintainer	22	15	37
Regressor	3	10	13
Total	31	31	62

TABLE 6. Within-Group Comparison of T1 and T2 Data

Measure	T1		T2		<i>p</i>	Effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Experimental group						
Cognitive POC	69.42	9.23	67.61	8.89	.272	.20
Behavioral POC	71.00	8.96	67.45	8.23	.025	.43
DB	1.84	0.94	1.71	0.90	.461	.13
CSE	6.74	1.92	6.35	1.89	.252	.21
SSE	7.01	2.14	6.49	2.23	.145	.27
TSE	8.25	1.12	8.08	1.52	.454	.14
Control group						
Cognitive POC	65.71	12.86	59.16	13.70	.006	.53
Behavioral POC	70.55	12.51	63.42	12.20	.000	.81
DB	2.27	1.04	1.77	0.90	.002	.60
CSE	6.88	1.62	6.30	2.16	.059	.35
SSE	7.25	1.86	6.10	2.59	.004	.57
TSE	8.40	1.18	8.35	1.24	.863	.03

Note. Both the control group and the experimental group show mediators of exercise behavior at T1 and T2; the statistical method is a dependent *t* test, with a confidence interval at 95%. The *p* value depicts the value for a two-tailed dependent *t* test comparing T1 and T2. POC = process of change; DB = decisional balance; CSE, SSE, and TSE = coping, scheduling, and task self-efficacy, respectively.

Our findings related to the coping, scheduling, and task self-efficacy score of the control group are also consistent with previous research. In comparison to T1 results, fewer students in the control group reported exercising at or above the criterion level, and of the 3 self-efficacy-related scores, only scheduling self-efficacy demonstrated a significant negative change (although coping self-efficacy approached significance at $p = .059$). Rodgers et al³⁶ demonstrated that task self-efficacy was significantly related to behavioral intention to exercise, whereas scheduling self-efficacy was significantly related to exercise adherence. In other words, individuals' confidence in their ability to perform the task is related to whether they initiate the exercise behavior, but individuals' confidence in their ability to allot time for the behavior is related to exercise adherence. Other findings have shown coping and scheduling self-efficacies to be better discriminators of exercise behavior than task self-efficacy.²⁰

The data did not support our third hypothesis—that scores related to the mediators of exercise behavior change would increase in the group receiving the personal trainer services. The scores for all mediators decreased over the course of the semester; however, only the behavioral POCs decreased to the point of statistical significance. With respect to the number or type of personal trainer sessions, further data analysis revealed that (1) there was no significant difference (one-way between-subjects ANOVA, $p > .05$) in the change in cognitive and behavioral POCs, decisional balance, and coping, scheduling, or task self-efficacy scores from T1 to T2 and (2) there was no significant difference (chi-square test, $p > .05$) in the category of exercise behavior change.

In evaluating the effectiveness of the personal trainer services in the college setting, we found that the group of students receiving the personal trainer services reported

a significantly more positive pattern of exercise behavior change. The experimental group as a whole maintained the same number of students exercising at or above the criterion level, whereas the control group regressed. The nature of the personal trainer services may have contributed to the lack of progressors and active maintainers in the experimental group. The personal trainer services were not intentionally matched with the student's stage of exercise change (ie, the personal trainers did not assess stage of change). However, as part of a routine initial consultation interview, the students were asked to provide information on their goals related to exercise and exercise adherence. In this interview process, some students might have provided information that allowed the personal trainer to tailor services to the student's stage of exercise change, whereas other students did not provide such information. Researchers have found stage-based exercise intervention programs to be more successful in promoting exercise behavior in community⁴¹ and worksite⁴² settings. Personal trainer services, which intentionally incorporated stage-specific interventions, might have provided greater benefit in facilitating exercise adherence.

A second important point in evaluating the results of this study is the lack of a direct cause-and-effect relationship between receiving personal trainer services and the difference in pattern of exercise behavior change. Although the difference in pattern of exercise behavior change was significant, we cannot determine if the personal trainer services actually caused that difference. Other intrinsic or extrinsic factors may have facilitated students who were ready to adhere to the criterion exercise level to seek out the personal trainer services. Further research is needed in this area.

Additional limitations should be considered when one is interpreting these results. First, the relatively small number

of participants who self-selected to obtain the personal trainer services limits the generality of the results. Second, we do not know whether the relatively high number of students in the action and maintenance stage at baseline accurately represents the population of students who received the personal trainer services.

Identifying effective intervention strategies to promote exercise adherence in college students,²¹ especially women,²⁸ is necessary. Our findings provide evidence that nonstage-specific certified personal trainer services can be effective in maintaining or at least limiting the regression of stage of exercise behavior change over the course of a semester in female college students. Other authors⁴³ have advocated the importance of maintaining positive health behaviors such as exercise as part of a comprehensive health-promotion program. We also used the constructs of the TTM to provide evidence of how the certified personal trainer services might have influenced the pattern of exercise behavior change.

NOTE

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