

# Implementation Intentions, Occupational Stress, and the Exercise Intention–Behavior Relationship

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Many individuals intend to exercise, but fail to link this intention to behavior. The present study examined the impact of an implementation intention intervention (i.e., instructions to form specific if–then plans) on an exercise intention–behavior relationship among working adults who varied in reported occupational stress levels. Results indicated that implementation intentions backfired, such that participants who did not form an implementation intention exercised significantly more than participants who formed an implementation intention.

*Keywords:* job stress, occupational stress, implementation intention, theory of planned behavior, exercise

Chronic diseases, along with many acute illnesses, contribute to the ever-growing costs of health care and absenteeism in organizations (Cascio, 1991). Smoking, physical inactivity, excess body fat, high blood cholesterol levels, high blood pressure, and diabetes have all been identified as preventable risk factors for cardiovascular disease, the leading cause of death for individuals 65 years and older and the second leading cause of death for individuals 45 to 64 years old in the United States as of 2002 (American Heart Association, 2004). Many individuals intend to eat well, quit smoking, and/or exercise regularly, but fail to link this intention to actual behavior. High occupational stress levels further weaken this intention–behavior relationship (Payne, Jones, & Harris, 2002). Unfortunately, during times of high stress individuals are less likely to follow through with an intention to maintain a healthy way of life.

High occupational stress levels directly influence many aspects of an individual's life. For example, high stress levels are associated with a higher fat diet, less frequent exercise, increases in smoking, and low-

ered self-efficacy to quit smoking for working adults (Ng & Jeffery, 2003). Furthermore, individuals who report high levels of stress have a higher susceptibility to acquire illness (Cohen, Tyrrell, & Smith, 1991), have poorer job satisfaction (Barnett, Marshall, Raudenbush, & Brennan, 1993), and most troubling, have increased risk for cardiovascular disease (Kristensen, 1996; Schnall, Landsbergis, & Baker, 1994).

As stress is detrimental to quality of life, exercise is beneficial. A recent study found that participants who did not exercise were more likely to suffer physical and psychological setbacks. In contrast, participants who exercised got a cognitive, psychological, and physical boost that was completely lost if they did not routinely engage in physical activity (Emery, Shermer, Hauck, Hsiao, & MacIntyre, 2003). Results of this study clearly indicate the importance of incorporating exercise into weekly routines.

Many individuals intend to exercise but fail to link this intention to behavior. The current investigation examined exercise intention and behavior in a group of working adults. Specifically, exercise intention and behavior were investigated in the context of the theory of planned behavior (i.e., attitude, subjective norm, perceived behavioral control, intention, and behavior). In addition, the present study examined the impact of an implementation intention intervention (i.e., instructions to form specific if–then plans) on the exercise intention–behavior relationship among working adults who varied in reported occupational stress levels.

## Theory of Planned Behavior

The theory of planned behavior (Ajzen, 1988) posits three independent determinants (attitude, subjec-

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This research was conducted as part of Jill S. Budden's master's thesis, under the supervision of Brad J. Sagarin. An earlier version of this article was presented at the 21st annual meeting of the Society for Industrial and Organizational Psychology, Dallas, Texas, May 2006. We thank Christopher Parker and Lisa Finkelstein for their contributions to earlier versions of this article.

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tive norm, and perceived behavioral control) to form an intention to predict a specific behavior. *Attitude* is favorable or unfavorable evaluations of a behavior. *Subjective norm* is perceived social pressure to perform or not perform a behavior. *Perceived behavioral control* is an evaluation of whether one has access to the necessary resources and/or opportunities to perform a behavior. *Intentions* are assumed to give an indication of how hard people are willing to try to perform a behavior and how much effort they plan to exert. The theory posits intention as a function of attitude, subjective norm, and perceived behavioral control and behavior as a function of intentions and perceived behavioral control.

*Hypothesis 1:* Attitude toward exercise, subjective normative influence to exercise, and perceived behavioral control to exercise predict exercise intention.

*Hypothesis 2:* Exercise intention and perceived behavioral control to exercise predict exercise behavior.

The theory of planned behavior variables each reveal a different aspect of why individuals do or do not engage in a specific behavior (Ajzen, 1991). Take, for example, perceived behavioral control, which contains both self-efficacy beliefs (e.g., the belief in the ability or lack of ability to perform a behavior; Bandura, 1997) and control beliefs (e.g., the belief of having personal control over performing a behavior). Work has the ability to hinder exercise self-efficacy and control beliefs; hence, as reported occupational stress levels increase, perceived behavioral control to exercise may decrease.

*Hypothesis 3:* Occupational stress and perceived behavioral control to exercise are negatively related. Specifically, as occupational stress increases, perceived behavioral control to exercise decreases.

Overall, the theory of planned behavior has been used with varying degrees of success when applied to health behavior. The theory has been examined by looking at smoking (Higgins & Conner, 2003; Norman, Conner, & Bell, 1999), alcohol consumption (Johnston & White, 2003), sexual behaviors (White, Terry, & Hogg, 1994), health screening attendance (Sheeran & Orbell, 2000), diet (Armitage & Conner, 1999), cancer self-examinations (Orbell, Hodgkins, & Sheeran, 1997), and exercise (Hagger,

Chatzisarantis, & Biddle, 2002; Kimiecik, 1992), to name a few. In the majority of studies, a weak intention-behavior relationship was evident. People formed an intention, but often did not follow through with the intended behavior. The question becomes, how can one strengthen an intention-behavior relationship?

### Implementation Intentions

According to Gollwitzer (1993, 1999), movement toward a goal starts with a motivational phase in which costs and benefits of the goal are analyzed. The motivational phase ends with a goal intention, a decision of whether to perform the behavior (e.g., "I intend to do X"). This phase is similar to Ajzen's (1991) view of three independent determinants (i.e., attitude, subjective norm, and perceived behavioral control) to form an intention. Ajzen stopped here and posited that intention is predictive of subsequent behavior. However, intention typically accounts for only 20% to 30% of the variance in future behavior (Ajzen, 1991), indicating that many people intend to perform, but do not succeed in performing, their desired behavior. Gollwitzer (1993) posited, apart from the theory of planned behavior, a volitional phase consisting of efforts to initiate the intended behavior by forming specific plans of where, when, and how to implement the desired behavior. These are termed *implementation intentions* (e.g., "I intend to do X at Time Y and in Location Z").

The effectiveness of an implementation intention intervention, when applied to health behavior, is evidenced by the following: Implementation intentions have the ability to increase attendance for cervical cancer screenings (Sheeran & Orbell, 2000), improve the likelihood of performing breast self-examinations (Orbell, Hodgkins, & Sheeran, 1997), improve the likelihood of vitamin C use (Sheeran, Orbell, & Norman, 1999), and improve an individual's ability to eat a healthy diet (Verplanken & Faes, 1999; Armitage, 2004). Additionally, implementation intentions have the ability to: increase physical activity after a myocardial infarction (e.g., Luszczynska, 2006), increase the likelihood of watching and actively engaging in a short exercise video (Walsh, da Fonseca, & Banta, 2005), increase exercise frequency, total time spent exercising, and increase fitness improvements (Prestwich, Lawton, & Cooner, 2003). Finally, implementation intentions, in combination with a motivational intervention, have the ability to increase the likelihood of exercise adherence (Milne, Orbell, & Sheeran, 2002).

*Hypothesis 4:* Employees who form an implementation intention are more likely to engage in exercise behavior versus employees who do not form an implementation intention.

When action initiation is easy to begin with, it is important to note that implementation intentions do not produce an additional advantage over simple goal intentions (Gollwitzer & Brandstätter, 1997). Therefore, implementation intentions may provide an additional advantage for individuals with life situations that impede goal progress. For example, employees who report high occupational stress levels may benefit more from an implementation intention intervention compared with employees who report low occupational stress levels.

*Hypothesis 5:* As occupational stress increases, the effect of an implementation intention on exercise behavior increases.

In sum, the current study contributes to both the implementation intention and the theory of planned behavior literatures by investigating the impact of an implementation intention intervention on the exercise intention-behavior relationship among working adults who varied in reported occupational stress levels.

## Method

### *Participants and Procedure*

In an effort to obtain a broad sample, with participants employed in a wide range of occupations, students at a large midwestern university recruited working adults to participate in exchange for extra credit. All data collection occurred online. Students provided participants with a Web link to the first phase of the study. Participants provided their e-mail addresses and the recruiting student's identification number to facilitate distribution of the second phase of the study and extra credit points.

The first phase of the study assessed the following: (a) occupational stress, (b) the theory of planned behavior variables (i.e., attitude toward exercise, subjective normative influence to exercise, perceived behavioral control to exercise, and exercise intention), and (c) obligation to comply. In addition, the first phase contained the implementation intention manipulation. Specifically, participants were randomly assigned to either (a) receive instructions to form an implementation intention specifying when,

where, and how they were going to carry out their intended exercise behavior or (b) receive no instructions.

One week after completion of the first phase of the study, participants were sent an e-mail containing a Web link to the second phase. The second phase assessed the amount of exercise performed during the 7 days directly following the completion of the initial phase of the study. Specifically, the participants were asked to indicate how many times and the number of minutes they engaged in exercise behavior.

Six hundred thirty-five participants completed Phase 1 and 332 participants completed both Phase 1 and Phase 2. Thus, a 52% response rate was obtained for follow-up. Of the 332 remaining participants, 38 were removed from analyses for not following the directions for the occupational stress assessment. That is, participants were instructed to select a 5 on the first item of the occupational stress measure to use as a standard for evaluating the remaining items. Participants who did not select a 5 on the first question were removed from the analyses. An additional 2 participants were removed for having more than five missing data points (Spielberger & Vagg, 1999). An additional 18 participants were removed for not completing a theory of planned behavior measure (e.g., intention). Thus, 274 participants remained for the first set of analyses.

The sample was 60% female and 40% male. The average time in the current occupation was 7 years, 8 months (range = 1 month to 39 years, 11 months). The age distribution was as follows: 18–24 years old, 28%; 25–34, 23%; 35–44, 16%; 45–54, 24%; 55–64, 8%; and 65–74, fewer than 1%. The ethnic identification distribution was as follows: Caucasian, 87%; African American, 5%; Hispanic, 3%; Asian, 3%; and other, 2%. The marital status distribution was as follows: single, 41%; married, 52%; widowed, fewer than 1%; separated, fewer than 1%; and divorced, 5%. The years of education distribution was as follows: fewer than 12 years, fewer than 1%; 12 years, 15%; 13–15 years, 40%; and 16-plus years, 45%. Participants held a variety of jobs such as waitress, crane operator, and finance manager.

### *Phase 1 Measures*

*The Job Stress Survey (JSS).* The JSS (Spielberger & Vagg, 1999; Vagg & Spielberger, 1998) has two sections with 30 questions per section. Section 1 assessed perceptions of stressors at work. For example, participants were asked to indicate how stressful working overtime was; if they did not work overtime,

the participants were instructed to indicate how stressful it would be for them on a 9-point scale on which 1 indicated a low amount of stress, 5 indicated a moderate amount of stress, and 9 indicated a high amount of stress. Section 2 assessed the approximate number of days during the past 6 months on which the participant had personally experienced each stressful event. For example, if participants had not worked overtime in the past 6 months, they were instructed to select 0 on the 0–9 scale; if participants had worked overtime 9 or more days in the past 6 months, they were instructed to select 9.

*Theory of planned behavior.* Items used to assess the theory of planned behavior variables were obtained from Conner and Sparks (1996) and Sheeran and Orbell (2000). The wording and scaling of the items are highly consistent with past studies (e.g., Ajzen & Fishbein, 1980; Armitage, 2004; Kimiecik, 1992; Orbell, Hodgkins, & Sheeran, 1997; Payne, Jones, & Harris, 2002; Sheeran & Orbell, 2000; Umeh & Patel, 2004). Attitude toward exercise was assessed with a five-item semantic differential scale, for example, “Exercising in the next week is 1 (very unpleasant) to 7 (very pleasant)” ( $\alpha = .79$ , average interitem correlation = .44, average item-total correlation = .73). Subjective normative influence to exercise was assessed with a four-item scale, for example, “On a whole people who are important to me think I, 1 (should) to 7 (should not), exercise in the next week” ( $\alpha = .43$ , average interitem correlation = .19, average item-total correlation = .62). The deletion of one scale item, “I feel under social pressure to exercise in the next week, 1 (strongly disagree) to 7 (strongly agree),” improved reliability estimates ( $\alpha = .51$ , average interitem correlation = .31, average item-total correlation = .73). Alpha reliability did not reach the minimum criterion of .70 (Nunnally, 1978). However, given the importance of subjective norm within the theory of planned behavior, and somewhat comparable average interitem correlations and item-total correlations for perceived behavioral control to exercise and attitude toward exercise, we decided to retain this measure. Regardless, caution should be taken in interpretation of subjective normative influence to exercise. Perceived behavioral control to exercise was assessed on a five-item scale, for example, “I would like to exercise in the coming week but I don’t really know if I can, 1 (strongly disagree) to 7 (strongly agree)” ( $\alpha = .74$ , average interitem correlation = .36, average item-total correlation = .70). Exercise intention was assessed with a two-item scale, for example, “I intend to exercise in the following week, 1 (definitely do not) to 7 (definitely

do)” (average interitem correlation = .90, average item-total correlation = .96).<sup>1</sup>

In addition, a dichotomous intention measure (i.e., exercise vs. no exercise intention) and two continuous outcome measures (i.e., number of minutes and times intended) were utilized. Number of minutes and times intended were standardized and added to form one composite continuous exercise intention measure. Dichotomous intention was used as a filter for the implementation intention analyses, and continuous intention was used to test the equivalence of the implementation intentions for the group that formed exercise intentions versus the group that did not.

*Obligation to comply.* A measure of feeling of obligation to comply was included to measure a potential alternative explanation for the implementation intention results, specifically, whether the implementation intention manipulation caused participants to feel greater obligation to comply (Brandstätter, Lengfelder, & Gollwitzer, 2001). Compliance was assessed with two items: “I feel committed to exercise in the following week, 1 (definitely no) to 7 (definitely yes)” and “I feel I have to engage in exercise in the following week, 1 (definitely no) to 7 (definitely yes)” (average interitem correlation = .77, average item-total correlation = .94).

### *Phase 1 Implementation Intention Intervention Manipulation*

One half of the participants were instructed to write out an implementation intention specifying when, where, and how they planned to implement their goal intention. Specifically, participants in the implementation intention condition were asked to fill in the blanks to the following passage:

Many people find they intend to exercise but then forget or “never get around to it.” It has been found that if you form a definite plan of exactly when, where, and how you will exercise you are more likely to exercise as planned and less likely to forget or not get around to exercise. Please take a moment to PLAN WHEN, WHERE, AND HOW you will exercise in the next week: During the next week I will participate in (form of exercise) \_\_\_\_\_; on (day or days) \_\_\_\_\_; at (time of day) \_\_\_\_\_; in/at (place/location) \_\_\_\_\_.

All participants who were instructed to form an implementation intention appropriately completed

<sup>1</sup> Alpha reliabilities for two-item scales were not reported.

the blanks in the passage. The implementation intention manipulation was obtained from Milne, Orbell, and Sheeran (2002). This method is consistent with past studies (e.g., Armitage, 2004; Gollwitzer & Brandstätter, 1997; Orbell et al., 1997; Sheeran & Orbell, 2000).

### Phase 2 Exercise Behavior Measures

The follow-up measure, exercise behavior, was assessed 1 week after participants completed the first phase of the study. One categorical outcome measure (i.e., exercise vs. no exercise) and two continuous outcome measures (i.e., number of minutes exercised and number of times exercised) were used. Number of minutes and times exercised were standardized and added to form one composite continuous exercise behavior measure. Hence, analyses using the follow-up measure, exercise behavior, were conducted twice—once using the continuous exercise behavior measure and once using the dichotomous exercise behavior measure.

## Results

Skew, kurtosis, and outliers were examined. Sixteen outliers more than 3.29 standard deviations away from the mean were found at the item level. Adjusting the outliers so that the scores remained deviant by assigning the outlier the next most extreme score (Tabachnick & Fidell, 2001) did not change any results meaningfully. All results are presented with outliers unadjusted. Means, standard deviations, av-

erage item-total correlations, and intercorrelations between study variables are presented in Table 1.

### Theory of Planned Behavior Analyses

Hierarchical multiple regression was used to predict exercise intention by entering attitude toward exercise, subjective normative influence to exercise, and perceived behavioral control to exercise at Step 1, the two-way interaction terms at Step 2, and the three-way interaction term at Step 3. Variables used to test for interactions were mean centered before computing interaction terms to reduce multicollinearity (Aiken & West, 1991). Table 2 presents the results, which indicated that Hypothesis 1 was partially confirmed. Specifically, attitude toward exercise, subjective normative influence to exercise, and perceived behavioral control to exercise explained 40% of the variance in exercise intention; however, subjective normative influence to exercise was not a significant predictor of exercise intention ( $B = .08$ ,  $p = .96$ ). In addition, a three-way interaction contributed a significant increment in the variance accounted for ( $\Delta R^2 = .01$ ,  $p < .05$ ). The interaction was decomposed in the manner proposed by Aiken and West (1991). Simple slopes were computed for perceived behavioral control to exercise at four levels of combinations of high and low levels of attitude toward exercise and subjective normative influence to exercise (i.e., 1  $SD$  above and below their respective means). Figure 1 illustrates that when attitude toward exercise and subjective normative influence to exercise were low, perceived behavioral control to

Table 1  
Means, Standard Deviations, Average Item-Total Correlations, and Intercorrelations Between Study Variables ( $N = 274$ )

Variable	1	2	3	4	5	6	7	8
1. Attitude toward exercise	(.73)							
2. Subjective normative influence to exercise	.12*	(.73)						
3. Perceived behavioral control to exercise	.39**	.06	(.70)					
4. Exercise intention	.57**	.12	.47**	(.98)				
5. Continuous exercise behavior	.41**	-.03	.31**	.50**	—			
6. Dichotomous exercise behavior	.33**	-.03	.27**	.48**	.64**	—		
7. Occupational stress	-.03	.15*	-.16**	-.13*	-.10	-.11	(.94)	
8. Implementation intention <sup>a</sup>	-.07	.01	.06	-.02	-.13*	-.06	.03	—
<i>M</i>	5.79	5.99	5.39	5.44	0.00	0.76	19.56	0.47
<i>SD</i>	1.06	1.07	1.25	1.87	1.83	0.43	11.16	0.50

Note. Relationships for analyses excluding no intention to exercise are not presented. Average item-total correlations are shown on the diagonal.

<sup>a</sup>0 = not formed, 1 = formed.

\* $p < .05$ . \*\* $p < .01$ .

Table 2  
 Summary of Hierarchical Regression Analysis for Variables Predicting Intention to Exercise (N = 274)

Predictor	SE		t	$\Delta R^2$
	B	B		
Step 1				
Attitude toward exercise (A)	.80	.09	8.77**	.40**
Subjective normative influence to exercise (S)	.08	.08	0.96	
Perceived behavioral control to exercise (P)	.43	.08	5.64**	
Step 2				
Attitude toward exercise	.83	.09	9.10**	.01
Subjective normative influence to exercise	.09	.08	1.05	
Perceived behavioral control to exercise	.44	.08	5.72**	
A × S	.13	.08	1.54	
A × P	.13	.06	2.04*	
S × P	-.03	.07	-0.41	
Step 3				
Attitude toward exercise	.82	.09	9.06**	.01*
Subjective normative influence to exercise	.15	.09	1.74	
Perceived behavioral control to exercise	.45	.08	5.86**	
A × S	.09	.08	1.11	
A × P	.16	.06	2.43*	
S × P	-.03	.07	-0.38	
A × S × P	-.14	.06	-2.29*	

Note. Step 1 *df* for  $\Delta R^2(.40^{**}) = 3, 270$ . Step 2 *df* for  $\Delta R^2(.01) = 3, 267$ . Step 3 *df* for  $\Delta R^2(.01) = 1, 266$ .  
 \*  $p < .05$ . \*\*  $p < .01$ .

exercise did not predict exercise intention ( $B = .15, p = .31$ ). However, when attitude toward exercise was low and subjective normative influence to exercise was high ( $B = .41, p < .01$ ), when attitude toward exercise and subjective normative influence to exercise were high ( $B = .43, p < .01$ ), and when attitude toward exercise was high and subjective normative influence to exercise was low ( $B = .80, p < .01$ ), the predictive validity of perceived behavioral control to exercise increased.

Next, hierarchical multiple regression was used to predict continuous exercise behavior and hierarchical logistic regression was used to predict dichotomous exercise behavior by entering exercise intention at Step 1, perceived behavioral control to exercise at Step 2, and the interaction term at Step 3. Table 3 presents the results, which indicated that Hypothesis 2 was partially confirmed. Specifically, exercise intention explained 25% of the variance in continuous exercise behavior. Logistic regression indicated that exercise intention reliably distinguished whether individuals exercised or not ( $B = .60, p < .01$ ),  $\chi^2(1, N = 274) = 60.64, p < .01$ . However, perceived behavioral control to exercise did not contribute a significant increment in the variance accounted for in continuous exercise behavior ( $\Delta R^2 = .01, p = .11$ ), or in dichotomous exercise behavior,  $\chi^2(1, N = 274) = 1.24, p = .27$ . In addition, the Exercise Intention × Perceived Behavioral Control to Exercise interaction did not contribute a significant incre-

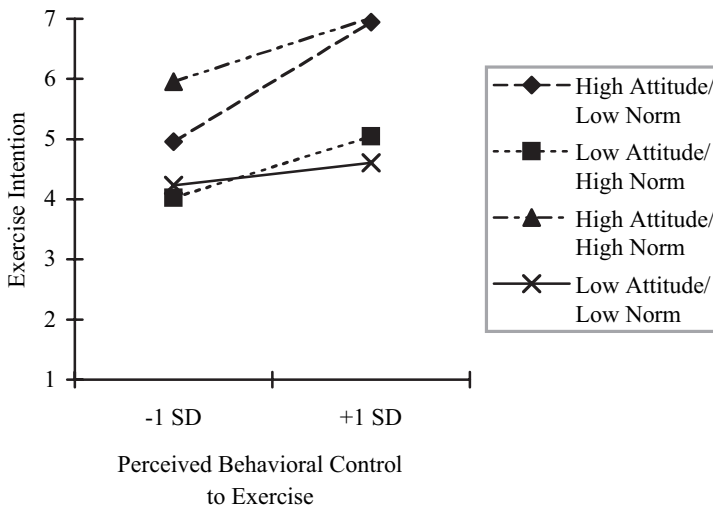


Figure 1. Simple effects of perceived behavioral control to exercise at low and high levels of attitude toward exercise and subjective normative influence to exercise.

Table 3  
Summary of Hierarchical Regression Analyses for Variables Predicting Exercise Behavior ( $N = 274$ )

Predictor	Continuous exercise behavior			Dichotomous exercise behavior		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Exercise intention (E)	.49**	.44**	.46**	.60**	.56**	.59**
Perceived behavioral control to exercise (P)		.16	.19*		.16	.27
E × P			.06			.10
$\Delta R^2$	.25**	.01	.01			
$\Delta \chi^2$				60.64**	1.24	2.40

Note. Steps contain unstandardized regression coefficients.  
\*  $p < .05$ . \*\*  $p < .01$ .

ment of variance in predicting continuous exercise behavior ( $\Delta R^2 = .01, p < .05$ ) or dichotomous exercise behavior,  $\chi^2(1, N = 274) = 2.40, p = .12$ .

Finally, a correlation analysis was used to investigate the relationship between occupational stress and perceived behavioral control to exercise. Results indicated that Hypothesis 3 was confirmed; occupational stress and perceived behavioral control to exercise were negatively related ( $r = -.16, p < .01$ ). In addition, correlations indicated that both occupational stress and perceived behavioral control to exercise were related to exercise intention ( $r = -.13, p < .05$ , and  $r = .31, p < .01$ , respectively). Hence, exploratory analyses were conducted to examine perceived behavioral control to exercise as a mediator of an occupational stress–exercise intention relationship. Following the procedures outlined by Baron and Kenny (1986), it was established that relationships existed between occupational stress and perceived behavioral control to exercise ( $\beta = -.16, p <$

.01) and between occupational stress and exercise intention ( $\beta = -.13, p < .05$ ). As shown in Figure 2, data are consistent with perceived behavioral control to exercise fully mediating the relationship between occupational stress and exercise intention ( $\beta = -.06, p = .27$ ); that is, the relationship between occupational stress and exercise intention became nonsignificant when controlling for perceived behavioral control to exercise.

Implementation Intention Analyses

For the next set of analyses, only individuals who had an exercise intention were included (i.e., as specified by the dichotomous exercise intention measure). Thirty-three participants who had no exercise intention were removed. First,  $t$  tests were conducted to ensure equivalences between the group that formed implementation intentions versus the group that did not in terms of feelings of obligation to comply and

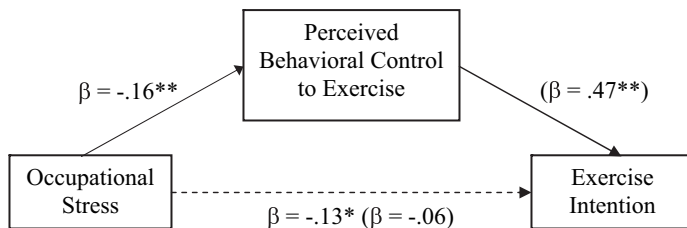


Figure 2. The mediating role of perceived behavioral control to exercise in the relationship between occupational stress and intention to exercise. Values not in parentheses are standardized beta coefficients indicating the unique contribution of the variable on the outcome variable. Values within parentheses are standardized beta coefficients indicating the effects of both occupational stress and perceived behavioral control to exercise on exercise intention.  
\*  $p < .05$ . \*\*  $p < .01$ .

strength of exercise intention. Results indicated that groups did not significantly differ on feelings of obligation to comply,  $t(239) = 0.53, p = .60$ ; exercise intention specified by the theory of planned behavior,  $t(239) = -0.47, p = .64$ ; nor continuous exercise intention (i.e., the composite measure of minutes and times intended),  $t(239) = -1.26, p = .21$ .

Next, hierarchical multiple logistic regression was used to predict exercise behavior. Implementation intentions formed versus not formed was entered at Step 1, occupational stress at Step 2, and the interaction term at Step 3. Table 4 presents the results, which indicated that Hypothesis 4 was not supported. Specifically, implementation intentions predicted continuous exercise behavior, however, in the opposite direction than predicted ( $B = -.55, p < .05$ ). On the other hand, implementation intentions did not predict dichotomous exercise behavior ( $B = -.23, p = .51, \chi^2 = (1, N = 241) = 0.44, p = .51$ ). Finally, Hypothesis 5 was not supported; the interaction of occupational stress and implementation intentions did not reach significance in the prediction of continuous exercise behavior ( $\Delta R^2 = .00, p = .42$ ), nor dichotomous exercise behavior ( $B = -.04, p = .24, \chi^2(1, N = 274) = 1.41, p = .22$ ).

## Discussion

Many individuals intend to exercise, but fail to link this intention to behavior. The current investigation examined exercise intention and behavior in a group of working adults. Specifically, exercise intention and behavior were investigated in the context of the theory of planned behavior. In addition, the present study examined the impact of an implementation intention intervention on the exercise intention-behavior relationship among working adults who varied in reported occupational stress levels.

Overall, it was hypothesized that: (1) attitudes toward exercise, subjective normative influence to exercise, and perceived behavioral control to exercise would predict exercise intention; (2) perceived behavioral control to exercise and exercise intention would predict exercise behavior; (3) occupational stress and perceived behavioral control to exercise would be negatively related; (4) employees who formed an implementation intention would be more likely to engage in exercise behavior versus those who did not form an implementation intention; and (e) as occupational stress increased, the effect of an implementation intention intervention on exercise behavior would increase.

First, Hypothesis 1 was partially supported. Attitude toward exercise and perceived behavioral control to exercise predicted exercise intention; however, subjective normative influence to exercise was not significantly related to exercise intention. Subjective normative influence to exercise may not have been related to exercise intention because of attenuation due to unreliability (Allen & Yen, 2002). Alternatively, Ajzen (1991) stated that in some applications of the theory of planned behavior, all three predictors of intention may not make independent contributions. In fact, the contribution of subjective normative influence to exercise in the prediction of exercise intention is typically smaller than the effect of attitude toward exercise and perceived behavioral control to exercise (Hagger et al., 2002). This result is consistent with the notion that exercise behavior relies more on personal motivation and is less subject to the influence of pressure from others (Godin, Valois, & LePage, 1993). In addition, results indicated a three-way interaction between attitude toward exercise, subjective normative influence to exercise, and perceived behavioral control to exercise. Specifically, individuals' confidence in their ability to exercise

Table 4  
Summary of Hierarchical Regression Analyses for Variables Predicting Exercise Behavior ( $N = 274$ )

Predictor	Continuous exercise behavior			Dichotomous exercise behavior		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
Implementation intention (I)	-.55*	-.54*	-.87	-.23	-.21	-.99
Occupational stress (O)		-.01	-.01		-.02	.03
I $\times$ O			-.02			-.04
$\Delta R^2$	.02*	.01	.00			
$\Delta \chi^2$				0.44	2.53	1.41

Note. Implementation intention formed = 1, not formed = 0. Steps contain unstandardized regression coefficients.  
\*  $p < .05$ .

was not related to exercise intentions if their attitude toward exercise and subjective normative influence to exercise were low. These individuals had a uniformly low level of exercise intentions, regardless of perceived behavioral control to exercise.

Second, Hypothesis 2 was partially supported. Exercise intention predicted both continuous and dichotomous exercise behavior; however, perceived behavioral control to exercise did not contribute to the predictions of continuous and dichotomous exercise behavior. According to Ajzen (1991), the relative importance of intentions and perceived behavioral control in the prediction of behavior is expected to vary across situations and behaviors. When an individual has complete control over behavioral performance, intentions alone should be sufficient to predict behavior. Thus, for the current study, it appears that individuals may have had complete control over their choice to engage in exercise behavior. That is, exercise behavior may not have been influenced by factors outside of the participant's control; for example, weather may not have affected an individual's ability to drive to the gym.

Third, Hypothesis 3 was fully supported. Specifically, as perceived behavioral control to exercise increased, occupational stress decreased. In addition, perceived behavioral control to exercise fully mediated the occupational stress-intention relationship.

Finally, Hypotheses 4 and 5 were not supported. Participants who formed an implementation intention specifying when, where, and how they would exercise in the coming week were not more likely to exercise than those who did not form an implementation intention. In fact, analyses indicated that implementation intentions backfired; specifically, participants who did not form an implementation intention exercised significantly more than participants who formed an implementation intention. In addition, as occupational stress increased, participants who formed an implementation intention were not more likely to exercise relative to other participants. Three explanations of the current study's unexpected implementation intention results are discussed.

First, Powers, Koestner, and Topciu (2005) found that implementation intentions failed to significantly improve goal progress (e.g., progress toward a New Year's resolution, of which 14% were health related). Also, results indicated that implementation intentions backfired for socially prescribed perfectionists. Socially prescribed perfectionists tend to be more self-conscious, self-evaluative, and self-critical in how they regulate thoughts, emotions, and behavior in relationship to goals. The researchers posited that

implementation intentions may have elicited self-criticism; that is, the socially prescribed perfectionists may have negatively evaluated their chances of achieving their goals. Overall, implementation intentions appeared to trigger a process that obstructed goal progress. A similar phenomenon may have occurred in the current study.

Second, the rigidity of implementation intentions may hurt performance that requires flexibility (Gollwitzer, Fujita, & Oettingen, 2004). Specifically, implementation intentions might restrain individuals from using alternative opportunities to act toward a goal (i.e., other opportunities not specified in the implementation intention). In the current context, implementation intentions might be too rigid and concrete for exercise behavior. That is, if an individual misses the critical environmental cue (e.g., exercising at 5:00 for 45 minutes) because of work or children, then this individual may not subsequently adapt to a new time (e.g., 8:00). On the other hand, effective implementation intentions may need a specified implemental backup plan. For example, "I will exercise at 5:00 a.m. every day on the treadmill," may need to be backed up by, "If I don't exercise at 5:00 I will exercise at 5:00 p.m. or exercise twice as long the next day." Further studies should examine these possibilities.

### *Limitations*

The current study had several limitations. First, there was a lack of control over the sample. In the present study, it was difficult to know who provided the responses in the Web-based methodology. Students recruited working adults in exchange for course credit. It remains a possibility, however, that the students simply recruited a friend and/or completed the study themselves. Two reasons suggest that this problem was not widespread in the sample: (a) Students or participants looking for a shortcut may not have completed the follow-up measures; hence, they would not have been included in the analyses, and (b) the amount of variance accounted for by the theory of planned behavior variables was highly consistent with past studies (see Hagger, Chatziantis, & Biddle, 2002). If the students were carelessly filling out the questionnaire, it is unlikely the current study's theory of planned behavior results would have been consistent with past studies. Nevertheless, it remains a possibility that some of the participants were not a part of the intended working adult population.

Second, although the study was longitudinal, all of the variables were measured with a common method

and at the same point in time. This limitation limits causal inferences among occupational stress and the theory of planned behavior variables. On the other hand, the implementation intention variable was manipulated; hence, appropriate causal inferences may be formed.

Third, the results may have been different if Phase 1 and Phase 2 were further apart in time. Specifically, the intention-behavior relationship may become weakened if the time between intention formation and behavior increases. According to Ajzen (1991), intentions and perceived behavioral control must remain stable during the time between initial assessment and actual behavior. Events that occur between the two assessments may produce changes in intentions or perceived behavioral control, resulting in a decreased ability to accurately predict behavior.

Fourth, subjective normative influence to exercise had low alpha reliability (i.e.,  $\alpha = .51$  with one item deleted). Measures in basic research should have an alpha of at least .70 (Nunnally, 1978). However, given the theoretical basis of the current study (i.e., the theory of planned behavior), we decided to retain the measure of subjective normative influence to exercise with one item deleted. Caution should be taken in interpretation of analyses that used this measure (i.e., Hypothesis 1 analyses).

### *Theoretical and Practical Conclusions*

Despite these limitations, the present investigation contributed to both the implementation intention and the theory of planned behavior literatures by investigating the impact of an implementation intention intervention on an exercise intention-behavior relationship among working adults who varied in reported occupational stress levels. Results were similar to Powers et al.'s (2005) finding of an implementation intention backfire effect. Although past research has suggested that implementation intentions have the ability to increase exercise behavior in specific populations (e.g., Luszczynska, 2006; Milne et al., 2002; Prestwich et al., 2003; Walsh, da Fonseca, & Banta, 2005), the present investigation suggests that implementation intentions may not function properly in all situations.

Practical implications suggest that organizations could improve the likelihood of employee exercise by influencing employees' attitudes toward exercise and by lowering occupational stress levels (which influence perceived behavioral control to exercise). In addition, the present study suggests that having employees make specific exercise plans may backfire. Instead, organizations could promote the benefits of exercise and provide

outlets for exercise, without giving employees the added pressures of setting specific exercise goals.

Additional research is needed to further examine the implementation intention backfire effect. Would less rigid implementation intentions or implemental backup plans increase performance? Or are implementation intentions only beneficial if coupled with a motivational intervention? Alternatively, do implemental plans to exercise arouse negative affect, a self-critical evaluation processes, or a concern about harsh judgment of others, as Powers et al. (2005) suggested occurs for socially prescribed perfectionists? In general, future research is needed to determine the factors that moderate the effectiveness of implemental plans for exercise.

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Received March 24, 2006

Revision received January 18, 2007

Accepted February 9, 2007 ■