



Changing Multiple Behaviors: Conflicting Associations Between Smoking and Exercise in a Hispanic Sample

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Abstract

An understanding of cognitive-behavioral mechanisms that underlie multiple risk behavior change may facilitate tailored intervention design in Hispanic populations with concurrent health risks. The present study examines smoking and exercise behaviors across self-efficacy, decisional balance, and stage of change constructs of the Transtheoretical Model (TTM). Hispanic college smokers ($n=265$) completed demographic and TTM questionnaires. Significant polychoric associations were uncovered between smoking and exercise readiness variables. Individuals reported greater confidence to resist situation-specific smoking and positive views toward smoking ($p's < 0.05$); unexpectedly, smoking self-efficacy variables were negatively associated with exercise stage of change ($p's < .05$). Within the structural model and consistent with expected hypotheses, increases in motivation to quit appear to influence increases in motivation to regularly exercise ($p < .05$), though increases in exercise motivation predicted lower motivation to quit smoking ($p < .05$). The pros and cons of smoking influenced smoking stage of change in the expected direction, though the opposite was true for exercise (see Figure 1). Perhaps influencing these unexpected findings, complexities in the associations between the pros and cons of both behaviors were observed. For Hispanics, predicted associations in the TTM smoking variables were more consistent, though the relationships with TTM exercise variables is less so. Moreover, there is clearly a nuanced relationship between smoking and exercise within Hispanic smokers. Such complexities highlight the need for efficacious, synergistic interventions tailored to multiple health behaviors that address discrete motivational change processes.

Objective

The current study investigated under-examined relationships between the specific behaviors of smoking and exercise across decisional balance, self-efficacy, and stage of change (SOC) constructs of the Transtheoretical Model.

Introduction

- Tobacco is the leading preventable cause of death, while physical inactivity is the most commonly reported chronic disease risk factor in the United States (Centers for Disease Control and Prevention, 2005; Fine et al., 2004).
- Evidence for the concomitance of health risk behaviors (Berrigan et al., 2003; Emmons et al., 1994), and the utility of exercise in smoking cessation (Ussher, 2005) highlight the importance of investigating change processes for smoking and exercise behaviors in tandem.
- To date, only two studies specifically examine smoking and exercise relationships across cognitive-behavioral variables (King et al., 1996; Boudreaux et al., 2003).
- The findings of King et al. (1996) and Boudreaux et al. (2003) confirm intuitive relationships between smoking and exercise readiness variables, whereby:
 - cons of smoking correlate significantly with the pros of exercise, and vice versa
 - higher self-efficacy in one behavior correlates with that of the other.
- Demographically, these relationships have been examined in predominantly Caucasian blue-collar workers (King et al., 1996) as well as low-income patients with chronic illness (Boudreaux et al., 2003).
- The present study aims to examine cross-behavioral relationships in a sample of Hispanic college students using a correlation matrix and a structural equation model.
- Hypotheses entail:
 - projected inverse relationships between smoking and exercise with regard to decisional balance and SOC variables (pros in one behavior correlating with cons of the other, and vice versa)
 - positive association between self-efficacy for quitting smoking, and smoking and exercise SOC
 - increases in SOC of exercise to be associated with that of smoking, and vice versa (feedback loop in a structural model)

Method

Participants

- Hispanic undergraduate students attending the University of Texas at El Paso ($n = 265$) anonymously completed 6 TTM questionnaires assessing cognitive-behavioral constructs of smoking and exercise behavior change motivation.
- Students received course credit for participation via Experimatrix or equivalent credit course.

Procedure

Informed Consent

- Participants were ensured questionnaire anonymity and informed of the risks and benefits of participation.

Confidentiality

- Surveys were filed separately from consent forms and coded by number to maintain participant confidentiality.

Measures

- The **CPRC Smoking: Stages of Change (Short Form)*** (DiClemente et al., 1991)
- The **CPRC Smoking: Decisional Balance (Short Form)*** (Velicer, DiClemente, Prochaska, & Brandenburg, 1985)
- The **CPRC Smoking: Self-Efficacy/Temptation (Short Form)*** (Velicer, DiClemente, Rossi, & Prochaska, 1990)
- The **CPRC Exercise: Stages of Change (Short Form)*** (Marcus, Selby, Niaura, & Rossi, 1992)
- The **CPRC Exercise: Decisional Balance*** (Nigg, Rossi, Norman, & Benisovich, 1998)

*Measure demonstrated adequate psychometric properties.

Approach to Analyses

- Spearman Correlations were estimated between ordinal/ordinal and ordinal/continuous variables.
- Latent path modeling was used to account for lack of association between smoking and exercise ordinal SOC variables
 - Feedback loop between Smoking and Exercise SOC was estimated
 - Decisional Balance measures were conceptualized as predictors of stage continuum
 - Smoking Self-Efficacy measures were not included in the latent path model.

Results

Table 1: Demographic Characteristics ($n = 265$)

Categorical Variables	%	%	Continuous Variables	Mean	SD	Coeff- α
Gender		Smoking SOC	Age of Participants	20.40	4.52	
Male	51	Precontemplation	Body Mass Index	24.26	5.29	
Female	49	Contemplation	DB: Pros Smoking	6.66	3.08	.80
		Preparation	DB: Cons Smoking	7.32	3.29	.68
		Action	SE: Smoking Pos Affect	8.75	3.22	.75
Ethnicity		Maintenance	SE: Smoking Neg Affect	8.01	4.21	.92
Mexican National	18	Maintenance	SE: Smoking Craving	5.36	2.81	.72
Mexican American	69		DB: Pros Exercise	9.27	4.04	.79
Other Hispanic	13	Exercise SOC	DB: Cons Exercise	20.17	4.11	.69
		Precontemplation				
		Contemplation				
		Preparation				
		Action				
		Maintenance				
Household Income						
< \$15,000	11					
\$15,000 to \$29,999	28					
\$30,000 to \$49,999	29					
> \$50,000	32					

Available Fit Indices
 $\chi^2(3) = 2.17, p < .54$
 CFI = 1.00
 TLI = 1.06
 RMSEA = .00
 WRMR = .22

Figure 1: Exercise and Smoking Stage of Change Feedback Loop Path Model

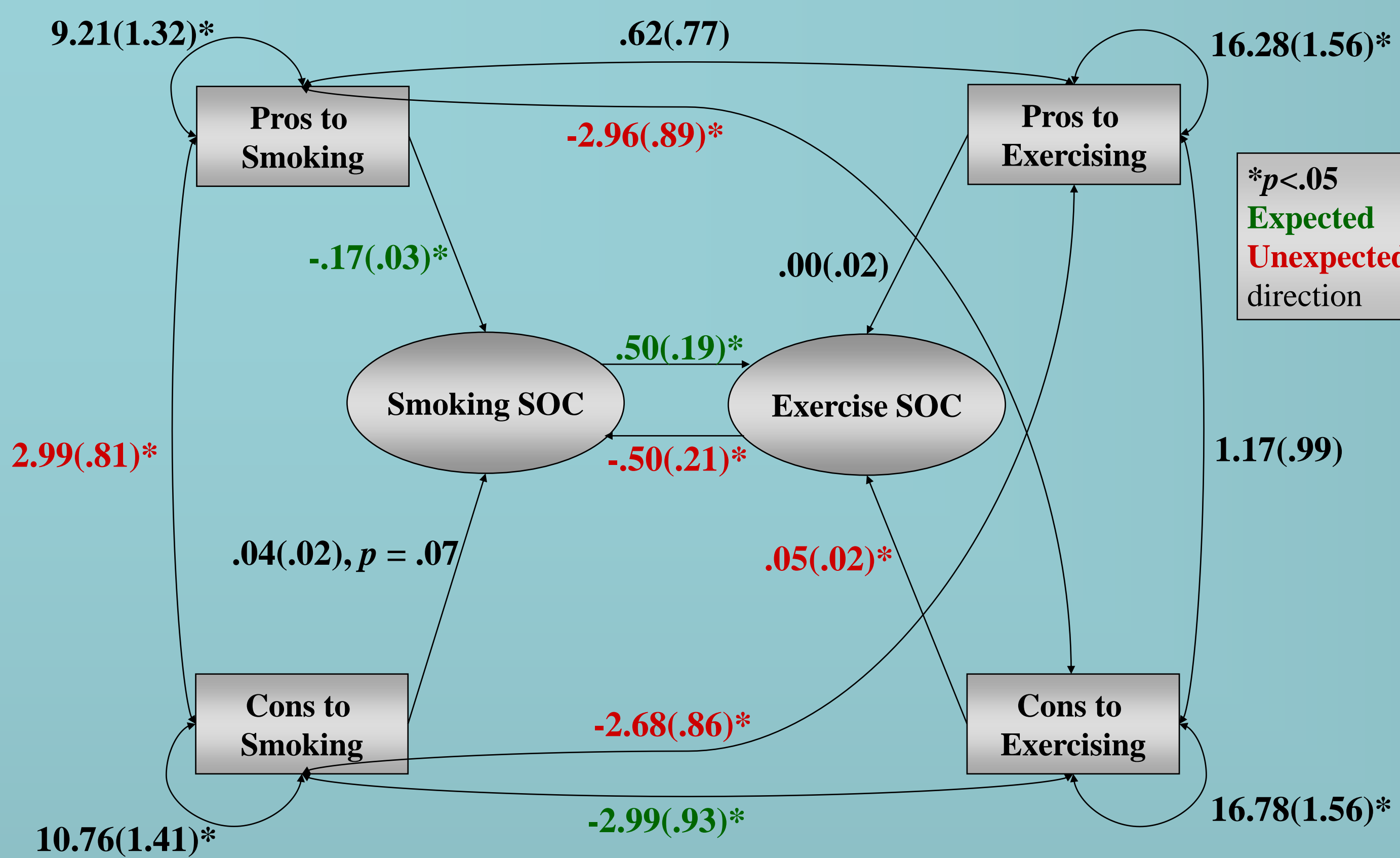


Table 2: Pairwise Pearson (Spearman) Correlations Between Measures

	Sm. SOC†	Sm. Pros	Sm. Cons	Exer. SOC†	Exer. Pros	Exer. Cons	Sm. SE: Pos	Sm. SE: Neg	Sm. SE: Hab
Sm. SOC	1.00								
Sm. Pros	$-.30^*$	1.00							
Sm. Cons	.01	$-.29^*$	1.00						
Exer. SOC †	.05	$-.24^*$	$-.07$	1.00					
Exer. Pros	$-.06$	$-.03$	$-.21^*$	$-.03$	1.00				
Exer. Cons	.04	$-.23^*$	$-.24^*$	$-.24^*$	.07	1.00			
Sm. SE: Pos	$-.31^*$	$.48^*$	$.24^*$	$-.19^*$	$-.11$	$-.20^*$	1.00		
Sm. SE: Neg	$-.30^*$	$.63^*$	$.20^*$	$-.23^*$	.03	$-.16^*$	.57*	1.00	
Sm. SE: Hab	$-.30^*$	$.58^*$	.14	$-.21^*$	$-.02$	$-.26^*$	.56*	.62*	1.00

Note 1: Sm. = Smoking; Exer. = Exercise; SOC = Stage of Change; SE = Self-Efficacy
 Note 2: Self-Efficacy subscales: Pos = Positive Affect; Neg = Negative Affect; Hab = Habit/craving

* $p < .05$
 † Spearman Correlation
 ○ Expected direction
 ○ Unexpected direction

Discussion

Path Model Findings:

- SOC:** Feedback loop suggests that smokers with increased motivation to quit smoking also exhibit higher motivation to adopt exercise, though the reverse is not true.
- Implications:** Researchers have speculated global, sequential, or discrete change processes of multiple behaviors simultaneously (Emmons et al., 1994; King et al., 1996).
 - In the current sample, two distinct change processes in smoking and exercise motivation are implicated:
 - A global readiness to quit smoking and adopt exercise simultaneously, when smoking behavior is primarily addressed
 - A discrete readiness to change exercise and smoking behaviors, when exercise behavior is primarily addressed.
 - These two paths suggest two distinct latent classes of individuals: some who opt for more global health behavior change and maintenance, and others who adopt a more sequential approach to health behaviors.
- Decisional Balance** Contrary to prior findings (Boudreaux et al., 2003; King et al., 1996), smoking and exercise do not reveal the expected inverse relationships for pros and cons of each behavior.
- Also unexpectedly, exercise cons increase with greater exercise SOC
- Implications** That individuals do not view smoking and exercise inversely may suggest uniqueness in this sample and / or challenge the potential role of exercise as a gateway to smoking cessation in multiple risk intervention programs.
- Increased exercise cons with SOC suggest that individuals may begin to discover negative consequences of exercising as the behavior is actually performed.
- Other Correlations: Self-Efficacy**
 - Greater confidence to resist situation-specific smoking correlates with positive views toward smoking and lower smoking and exercise SOC.
 - Implications:** That individuals view smoking positively and feel more confident in the ability to resist smoking may reflect age—post-adolescent in the current sample versus early middle-age in prior studies (Boudreaux et al., 2003; King et al., 1996)—as well as light-smoking characteristics (Rodriguez Esquivel et al., 2007).

Conclusion

- Unexpected findings across motivational and cognitive-behavioral mediators of smoking and exercise highlight heretofore unseen complexity and nuance in Hispanic college smokers.
- Conflicting associations may be attributed to age and associated light smoking patterns, as these smokers may not yet witness the health consequences of smoking that negatively impact exercise adoption.
- Discrete change processes in the current sample have implications in future intervention research and design that target smoking and exercise behaviors simultaneously in young Hispanics. Namely, efficacious interventions may primarily address smoking motivation to elicit exercise motivation.

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