



Rethinking barriers: a novel conceptualization of exercise barriers in cancer survivors

Morgan S. Lee^{a,b} , Brent J. Small^c and Paul B. Jacobsen^{a,d}

^aDepartment of Psychology, University of South Florida, Tampa, FL, USA; ^bDepartment of Health Sciences, University of Colorado Colorado Springs, Colorado Springs, CO, USA; ^cSchool of Aging Studies, University of South Florida, Tampa, FL, USA; ^dDivision of Cancer Control and Population Sciences at the National Cancer Institute, Bethesda, MD, USA

ABSTRACT

Previous research suggests different types of barriers may demonstrate different relationships with intention to engage in health behaviors. This study explored global, practical, and health-related barriers' relationships with exercise intention and behavior among cancer survivors. The mediating role of intention in the barriers-behavior relationships was also evaluated. Cancer survivors ($N = 152$) completed self-report measures of exercise barriers, intention, and behavior at baseline and of exercise behavior two months later. Global barriers were negatively related ($p < .01$) and practical and health-related barriers were unrelated ($ps \geq .07$) to exercise intention. Global and practical barriers were negatively related ($ps < .01$) and health-related barriers were unrelated ($p = .48$) to subsequent exercise behavior. Exercise intention did not mediate any barriers-behavior relationships. Results suggest that global and practical barriers should be targeted in barriers reduction interventions and highlight the intention-behavior gap problem. Future research should explore multidimensionality of barriers for other health behaviors.

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Introduction

Exercise provides general and disease-specific benefits for cancer survivors (e.g. Ibrahim & Al-Homaidh, 2011; Schmitz et al., 2010), but barriers may influence their exercise intention and behavior. Cancer survivors experience general exercise barriers including low motivation, time constraints, and fatigue (e.g. Lox, Martin, & Petruzzello, 2003; Sallis et al., 1989) and health-related barriers including hospitalizations, treatment side effects, and physical deconditioning (Blaney et al., 2010; Courneya et al., 2008). Although barriers have traditionally been conceived as solely negative in relation to intention and behavior (i.e. barriers are unidimensional) (e.g. Armitage & Conner, 2001), newer research in a non-cancer sample (Gerend, Shepherd, & Shepherd, 2012) suggests different types of barriers may be

differentially related to intention (i.e. barriers are multidimensional). This study extended that research to exercise intention and behavior in cancer survivors.

Gerend et al. (2012) theorized that different types of barriers would be salient to people who intend to engage in a health behavior versus people who do not, hypothesizing that practical barriers (i.e. concrete barriers such as financial costs for which a barrier mitigation plan can be designed) would be positively related to intention, while global barriers (i.e. abstract barriers such as disinterest for which there are no obvious actionable mitigation methods) would be negatively related to intention. As predicted, in a sample of young adult women who had not received HPV vaccine, practical barriers were positively related, and global barriers negatively related, to vaccination intention.

The present study extended Gerend et al.'s (2012) work by examining the multidimensional nature of barriers to exercise (global, practical, and health-related) in the context of both intention and behavior in a critical population group (cancer survivors). Additionally, because the intention-behavior gap phenomenon (i.e. intention and behavior are often discrepant) (Sheeran, 2002) raises the possibility that intention does not mediate the relationship between barriers and behavior, the role of intention as a mediator of barriers-behavior relationships was also explored. We hypothesized that practical barriers would be positively related to exercise intention and behavior, while global barriers would be negatively related to these outcomes. Because health-related barriers have not yet been evaluated in the multidimensional barriers context, their evaluation was exploratory.

Method

Recruitment and procedure

Inclusion criteria included (a) age 18–75; (b) previously diagnosed with non-metastatic breast, prostate, or colorectal cancer; and (c) completed active treatment 6–36 months prior. Following IRB approval, individuals identified from the Moffitt Cancer Center Tumor Registry and deemed eligible through medical record review received an emailed study invitation to the online study. See Figure 1 for a participant flow diagram. Participants completed a consent form and an initial survey as well as a brief follow-up survey two months later. The initial survey contained all study measures; the follow-up assessed only exercise behavior.

Measures

Demographics were assessed using a self-report form. Cancer diagnosis and treatment information were obtained through medical chart review. Exercise behavior was assessed using the self-administered short form of the International Physical Activity Questionnaire (Craig et al., 2003), which was scored using established guidelines (IPAQ Research Committee, 2005) to create a continuous score measured in MET-minutes per week. Exercise intention was assessed using two items: (1) 'On average during the next 2 months, my goal is to exercise the following number of days per week,' (0–7 scale); and (2) 'On average during the next 2 months, I intend to exercise at least every other day,' (7-point agreement scale). The items (which correlated $r = 0.55$) were each standardized to a 100-point scale, and their average was used as the intention score.

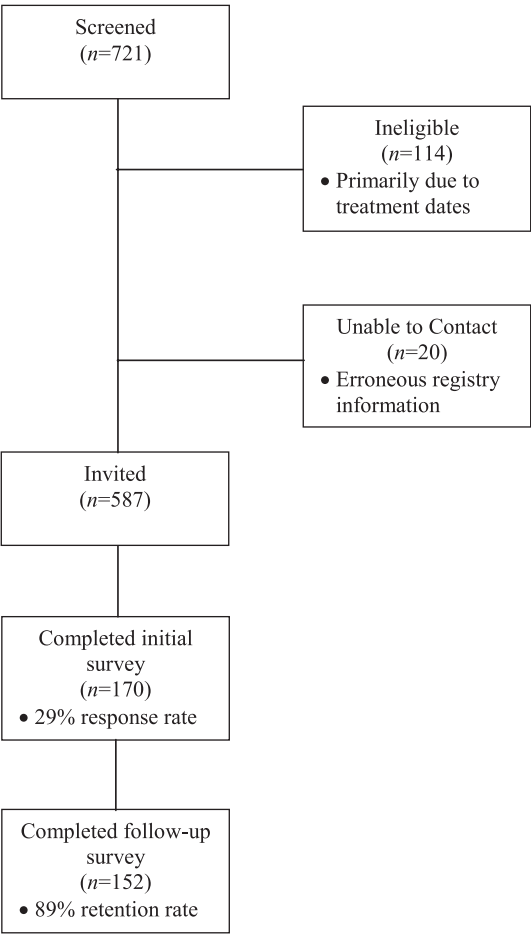


Figure 1. Flow diagram depicting study screening, invitations, and participation. Potential participants who did not respond to the initial invitation within one week were sent a reminder email. If an additional week passed with no response, a final email was sent, and an attempt was made to contact the person by phone.

Because no published measures of cancer survivors’ exercise barriers were found, a measure combining general barriers with barriers specific to cancer survivors was created. A multistep process involving generation of an extensive item pool based on review of existing exercise barriers measures and studies of exercise barriers in the cancer population, elimination of redundant items, expert review, feedback from cancer patients, and item classification by independent judges resulted in a 23-item measure intended to assess global barriers (7 items), practical barriers (6 items), and health-related barriers (10 items). Participants rated the extent to which each item could impact their exercise behavior during the next two months on a scale of 0 (*Not at all*) to 3 (*A lot*). See Table 1 for a listing of the barriers items and additional barriers information.

Table 1. Exercise barriers in order of descending reporting frequency (*N* = 170).

Barrier	Frequency		Type
	<i>N</i>	%	
Lack of motivation	97	57.1	G
Lack of time	83	48.8	P
Fatigue	76	44.7	H
Exercise not enjoyable	73	42.9	G
Lack of interest	73	42.9	G
Other health problems besides cancer	63	37.1	H
Weather conditions	59	34.7	P
Other preferences for leisure activities	58	34.1	G
Unpleasant sensations or symptoms caused by exercise	54	31.8	H
Cancer-related weakness	45	26.5	H
Lack of convenient facilities	45	26.5	P
Fear of injury	41	24.1	H
Cancer-related numbness or tingling	41	24.1	H
Cancer-related joint stiffness	40	23.5	H
Exercise not important to me	40	23.5	G
No one to exercise with	40	23.5	P
No instructor to guide me	28	16.5	P
Fear of making other health problems worse	27	15.9	H
Financial cost/fees	27	15.9	P
Other cancer-related symptoms or treatment side effects	27	15.9	H
Cancer-related pain	25	14.7	H
Embarrassment	21	12.4	G
Lack of support from others	19	11.2	G

Notes: Percentages listed indicate the proportion of participants endorsing the item (i.e. rating the item higher than ‘not at all’). Responses were summed to yield scores for global barriers ($\alpha = 0.84$; $M = 3.36$, $SD = 3.91$), practical barriers ($\alpha = 0.64$; $M = 2.54$, $SD = 2.80$), and health-related barriers ($\alpha = 0.83$; $M = 4.13$, $SD = 4.97$). Correlations between the types of barriers were as follows: global-practical, $r = .66$; global-health, $r = .31$; practical-health, $r = .40$.

Statistical analyses

Using SAS 9.3, regression analyses examined the relationship between exercise barriers (initial survey), exercise intention (initial survey), and exercise behavior (follow-up survey). Within these analyses, mediational analyses examined whether exercise intention mediated barriers-behavior relationships. Separate models were run for global, practical, and health barriers. Path coefficients and bootstrapped confidence intervals were estimated using the INDIRECT macro (Preacher & Hayes, 2008).

Results

Characteristics of the 152 participants who completed both time points are displayed in Table 2. Study invitees who declined to participate did not differ from participants in age, gender, or cancer type ($ps > 0.10$); no other characteristics were available for comparison. Participants who completed both surveys reported more exercise at baseline than those who completed only the initial survey ($p = .01$) but did not differ on any other characteristics. Participants with a household income of at least \$40,000 per year reported stronger exercise intention ($t(130) = 2.28$, $p = 0.02$) and more exercise behavior ($t(130) = 2.31$, $p = 0.02$). Additionally, a significant inverse relationship between BMI and exercise behavior was found ($r = -.18$, $p = .03$). Consequently, income and BMI were entered as covariates in later analyses. No other demographic or clinical characteristics were related to exercise intention or behavior ($ps > 0.05$).

Table 2. Participants’ demographic, medical, and psychosocial characteristics (N = 152).

Variable	Mean	SD	Range
Age (years)	60.52	9.48	33–75
Years since diagnosis	2.58	0.57	1–4
Body mass index	27.62	5.84	18–50
Exercise intention	71.60	19.70	0–100
Exercise behavior (MET-minutes per week)	2604.00	2117.60	0–10,746
	N	%	
Gender			
Female	99	65.1	
Male	53	34.9	
Ethnicity			
Hispanic	8	5.3	
Non-Hispanic	144	94.7	
Race			
White	140	92.1	
Non-white	12	7.9	
Marital status			
Currently married	119	78.3	
Not currently married	33	21.7	
Education			
<College graduate	63	41.5	
≥College graduate	89	58.5	
Total household income			
<\$40,000	28	18.4	
≥\$40,000	104	68.4	
Declined to answer	20	13.2	
Cancer type			
Breast	92	60.5	
Prostate	39	25.7	
Colorectal	21	13.8	
Cancer stage (≤Stage 2)	129	84.9	
Weight status			
Underweight/normal weight	54	35.5	
Overweight	55	36.2	
Obese	43	28.3	

As hypothesized, the global barriers score was negatively related to exercise intention and exercise behavior (see Figure 2(a)). Contrary to predictions, the practical barriers score was not significantly related to exercise intention and was negatively related to exercise behavior (see Figure 2(b)). The health-related barriers score was not significantly related to either outcome (see Figure 2(c)), so the mediating effect of intention was not evaluated for health-related barriers.

A visual depiction of the mediation analyses is presented in Figure 2, where the barriers-intention relationships and barriers-behavior relationships discussed previously are the ‘a’ and ‘c’ paths respectively. For global barriers, exercise intention was not significantly related to exercise behavior (see Figure 2(a)), and the indirect effect of global barriers on exercise behavior was not significant using bootstrapping methods (indirect effect = −0.04; 95% CI = −0.36 to 0.30). Similarly, for practical barriers, exercise intention was not significantly related to exercise behavior (see Figure 2(b)), and the indirect effect of practical barriers on exercise behavior was not significant using bootstrapping methods (indirect effect = −0.10; 95% CI = −0.51 to 0.07). Thus, exercise intention did not mediate the barriers-behavior relationship for either type of barrier.

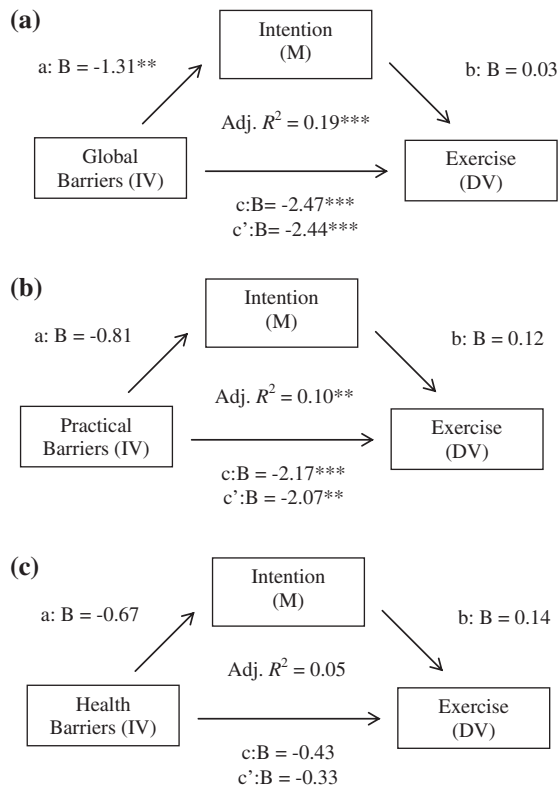


Figure 2. Tests of intention as mediator of relationships between exercise barriers and exercise.

Notes: Values based on tests of significance of regression coefficients. a = direct effect of independent variable (IV) on mediator (M). b = direct effect of M on dependent variable (DV). c = direct effect of IV on DV. c' = indirect effect of IV on DV. $*p < .05$; $**p < .01$; $***p < .001$.

Discussion

This study evaluated a global-practical distinction in exercise barriers for predicting exercise intention and behavior among cancer survivors, explored the influence of health-related barriers, and investigated the mediating role of intention in the barriers-behavior relationships. Although the hypotheses were only partially supported, the findings are not unprecedented. Other studies of exercise barriers in cancer survivors have found that only some barriers correlated significantly with stage of change (Rogers, Courneya, Shah, Dunnington, & Hopkins-Price, 2007), intention (Courneya & Friedenreich, 1997), and behavior (Lynch, Owen, Hawkes, & Aitken, 2010). The small number of relevant studies and methodological variations preclude evaluation of which barriers are consistently significant/non-significant in predicting exercise-related outcomes. Differences in study designs and health behaviors may explain why Gerend et al. (2012) global-negative, practical-positive pattern of barriers-intention relationships did not fully materialize here. Regarding behaviors, exercise must be performed regularly, whereas vaccination is an infrequent event. Barriers may impact intention differently for one-time or infrequent versus ongoing behaviors.

Relevant to the intention-behavior gap problem, intention did not mediate the barriers-behavior relationships, justifying concerns about using intention as a proxy for behavior

assuming that intention findings will generalize to actual behavior. Revision of existing models or development of new empirically-grounded models tailored to specific behaviors or types of behaviors (e.g. one-time/infrequent or ongoing) may be warranted.

Strengths and limitations

Study strengths include recruitment of participants representing multiple cancer types, theory-based approach, and measurement of both intention and behavior. Study limitations include the self-report measure of exercise behavior, simultaneous measurement of barriers and intention, and limited timespan that precludes conclusions about long-term patterns of relationships between study variables. Additionally, self-selection effects and high baseline values for exercise intention and self-reported exercise behavior may have limited the variability in exercise-related constructs.

Future directions

Since results differed by barrier type, further exploration of multidimensionality of exercise barriers and of relationships between barriers, intention, and behavior appears warranted. This work might also be extended to other health behaviors (e.g. diet). Additionally, interventions should target the barriers that are most likely to impede healthy behavior (here, global and practical, but not health, barriers). Global barriers might be addressed by motivation-related approaches such as motivational interviewing (e.g. Milne, Wallman, Guilfoyle, Gordon, & Courneya, 2008), while practical barriers might be mitigated through education about existing resources and implementation intention exercises (e.g. Chatzisarantis, Hagger, & Thøgersen-Ntoumani, 2008).

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Morgan S. Lee  <http://orcid.org/0000-0002-6860-3364>

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