# Physical Activity Preferences Among a Population-Based Sample of Colorectal Cancer Survivors

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hysical activity (PA) improves quality of life and disease outcomes in survivors of colorectal cancer (CRC) (Sellar & Courneya, 2011). Unfortunately, the benefits of PA can only be realized through regular participation (Courneya & Friedenreich, 1999). Not surprisingly, research has found that CRC survivor PA participation rates decline during treatment and may never regain prediagnosis levels (Courneya & Friedenreich, 1997a, 1997b). For example, in a population-based sample of Canadian cancer survivors (any type), Courneya, Katzmarzyk, and Bacon (2008) found that fewer than 22% of the survivors were sufficiently physically active to meet public health guidelines, with female (14%) and male (20%) CRC survivors reporting some of the lowest PA rates. In an American representative sample, only 35% of CRC survivors were meeting PA recommendations (Blanchard, Courneya, & Stein, 2008). Finally, in a cross-sectional study of 413 CRC survivors, only 26% of participants were meeting PA guidelines (Peddle, Au, & Courneya, 2008). These studies demonstrate that a substantial proportion of CRC survivors are not meeting PA guidelines and, therefore, are not sufficiently active to obtain health benefits.

Given the established benefits of PA and the low participation rates, a need exists to increase PA in cancer survivors. Understanding PA preferences would facilitate the design of optimal PA promotion (e.g., modality, frequency, location, delivery method) for cancer survivors. In addition, as proposed by most social cognitive models of human behavior (e.g., Theory of Planned Behavior), preferences will influence motivation and adherence (Ajzen, 1991). Several studies have examined PA and exercise preferences in a variety of cancer survivor groups, such as endometrial (Karvinen et al., 2006), head and neck (Rogers, Malone, et al., 2009), bladder (Karvinen, Courneya, Venner, & North, 2007), brain (Jones et al., 2007), kidney (Trinh, Plotnikoff, Rhodes, North, & Courneya, **Purpose/Objectives:** To identify the key physical activity (PA) programming and counseling preferences of colorectal cancer (CRC) survivors.

Design: Population-based, cross-sectional mailed survey.

Setting: Alberta, Canada.

Sample: 600 CRC survivors.

**Methods:** CRC survivors randomly identified through the Alberta Cancer Registry in Canada completed a mailed survey (34% response rate).

**Main Research Variables:** Self-reported PA, medical and demographic variables, and PA preferences.

**Findings:** Most CRC survivors indicated that they were interested and able to participate in a PA program. The most common PA preferences of CRC survivors were to receive PA counseling from a fitness expert at a cancer center, receive PA information in the form of print materials, start a PA program after cancer treatment, do PA at home, and walk in both the summer and winter. In addition, oncologists and nurses were identified as preferences from whom CRC survivors would like to receive PA information. Chisquare analyses identified that age, education, annual family income, and current PA were the demographic variables most consistently associated with PA preferences.

**Conclusions:** The majority of CRC survivors expressed an interest in participating in a PA program and key PA preferences were identified. Those preferences may be useful for developing and implementing successful PA interventions for CRC survivors.

**Implications for Nursing:** Oncology nurses are in a unique position to promote PA for CRC survivors. Therefore, understanding CRC survivor PA preferences is essential to assist nurses in making appropriate PA recommendations or referrals.

**Knowledge Translation:** Although CRC survivors' PA participation rates are low, they may have an interest in receiving PA programming and counseling. CRC survivors have indicated a preference to receive PA information from individuals within their cancer support team (e.g., fitness specialist at a cancer center, oncologist, nurses). The PA preferences identified by CRC survivors are important for the development of successful PA interventions.

2011), young adult (Bélanger, Plotnikoff, Clark, & Courneya, 2012), ovarian (Stevinson et al., 2009), and non-Hodgkin lymphoma (Vallance, Courneya, Jones, & Reiman, 2006). Jones and Courneya (2002a) explored exercise preferences in a mixed sample of cancer survivors (breast, prostate, lung, and CRC); however, CRC survivors only represented 13% of the overall sample.

As no study to date has focused on exploring CRC survivor PA preferences, the primary purpose of the present study was to identify the PA and counseling preferences in this cancer survivor group. The secondary purpose was to explore the associations between select medical and demographic variables and key preferences. Based on previous research findings (Bélanger et al., 2012; Jones & Courneya, 2002a; Jones et al., 2007; Karvinen et al., 2006, 2007; Rogers, Malone, et al., 2009; Rogers, Markwell, Courneya, McCauley, & Verhulst, 2009; Stevinson et al., 2009; Trinh et al., 2011; Vallance et al., 2006) and the older age of CRC survivors, the authors hypothesized that CRC survivors would have a strong preference for home-based PA, starting a PA program after treatment, and walking. No hypotheses were generated for the associations between select medical and demographic variables because this was considered exploratory.

## **Methods**

### **Participants and Procedures**

Full details regarding the study sample, recruitment, and procedures have been reported previously (Speed-Andrews et al., 2012). Ethical approval was obtained from both the Alberta Cancer Research Ethics Committee and the University of Alberta. To summarize, a random sample of 2,000 CRC survivors were identified through the Alberta Cancer Registry (ACR). CRC survivors were eligible to take part in the study if they were aged at least 18 years and diagnosed with CRC from 2003–2007. The ACR conducted the study on behalf of the researchers in 2008.

Eligible CRC survivors were mailed a study package that contained an invitation letter from the ACR explaining the purpose of the ACR and its role in the study, an introductory letter from the researchers explaining the nature of the study, a questionnaire booklet, and a postage-paid return envelope. Interested CRC survivors were asked to return the completed questionnaire package. To avoid additional contacts, CRC survivors who were not interested in participating could return the blank questionnaire. A modified version of the Total Design Method was used (Dillman, 2000), whereby participants who had not responded were mailed a postcard reminder three to four weeks after the initial questionnaire package, followed by a second questionnaire package three to four weeks later mailed to those who still had not responded. Telephone calls were not made to nonresponders because this was deemed too intrusive by the ethics boards—the only modification from Dillman's Total Design Method.

### Measures

PA was assessed using a modified version of the Leisure Score Index (LSI) of the Godin Leisure Time Questionnaire (Godin & Shephard, 1985). The LSI has been extensively validated (test-retest correlation coefficient = 0.24–0.84) (Jacobs, Hartman, & Leon, 1993) and contains three questions to assess the frequency of light, moderate, and vigorous PA during a typical week in the prior month that was done during leisure time. The LSI was modified to also include average duration. The authors calculated the percentage of survivors who were meeting public health PA guidelines (U.S. Department of Health and Human Services, 2008) of either 75 minutes of vigorous-intensity exercise per week, 150 minutes of moderate-intensity exercise per week, or any equivalent combination counting vigorous-intensity minutes as double.

Questions assessing interests and PA preferences were derived from previous studies that have explored cancer survivor PA preferences (Jones & Courneya, 2002a; Jones et al., 2007; Karvinen et al., 2006, 2007; Stevinson et al., 2009; Vallance et al., 2006), and were designed to address the "who, what, when, where, and how" of PA programs. Eleven closed-item questions and two openended questions were used to assess CRC survivor PA and programming preferences. In brief, one of the 11 closed-item questions allowed survivors to choose more than one response (i.e., How would you like to receive PA information?), whereas the remainder of the questions asked survivors to select only one response. The two open-ended questions asked CRC survivors about their favorite summer and winter activities. Finally, three questions asked about current fitness membership, home exercise equipment, and Internet access.

### **Statistical Analyses**

All analyses were performed using PASW Statistics 18. Data cleaning procedures (e.g., outlier detection, normality) were conducted to examine the accuracy of the data. Percentages and frequencies were calculated for each of the PA preference variables. Chi-square analyses were used to examine the associations between the demographic and medical variables with each PA preference. For the associations to be presented in the results, they needed to be statistically significant and represent at least a 10% difference between groups. All demographic and medical variables were dichotomized or trichotomized for the analyses. Whether or not public health PA guidelines were met also was examined. For the preference variables, "yes" and "maybe" were combined when the response options were "yes," "no," and "maybe." For "preferred time for starting a PA program," responses were divided into "during treatment" and "post-treatment." Finally, for delivery method, location of PA, and partner preferences, responses were analyzed as "yes" versus "no."

## Results

A detailed flow diagram has been published elsewhere (Speed-Andrews et al., 2012). In summary, 2,000 surveys were mailed and 600 were returned completed, resulting in a 30% completion rate and a 34% response rate (600/1,763) when excluding wrong addresses. Overall, the sample consisted of older Caucasian men (see Table 1) with a previous diagnosis of colon cancer (78%). In addition, 44% had early-stage disease, 24% were treated with radiation therapy, 10% were still receiving cancer treatment, 9% had a cancer recurrence, and 33% were meeting public health PA guidelines.

## **Physical Activity Preferences**

Descriptive statistics for the PA preferences are presented in Table 2. Results indicated that most CRC survivors were interested or maybe interested in receiving information about PA following diagnosis. The majority of CRC survivors felt they were able or maybe able to do a PA program and would be interested in a program to increase PA levels. CRC survivors preferred to receive PA information from a fitness expert at a cancer center, brochures or other print materials, face-to-face counseling, or from a self-help video. Walking was identified as the preferred type of activity in the summer and winter.

## Demographic and Medical Variables and Physical Activity Preferences

The significant associations between PA preferences and demographic and medical variables are summarized in Table 3. The most consistent associations between PA preferences and demographic variables were for age, education, annual family income, and current PA. The largest age differences showed that older CRC survivors were less likely to prefer doing PA with family and friends, less likely to prefer to receive PA information on the Internet, and less interested in doing a PA program for CRC survivors. The largest difference for education showed that CRC survivors with less than a college degree were less interested in doing a PA program for CRC survivors, less likely to prefer to do PA at a cancer center, and less likely to prefer to receive PA information via e-mail. The largest differences for annual family income showed that CRC survivors with an annual income less than \$59,999 (Canadian) were less likely to feel able to do a PA program for CRC survivors, less likely to prefer to receive PA information via e-mail, and less likely to prefer doing PA outside

# Table 1. Demographic and Medical Characteristics (N = 600)

Characteristic	n	%
Gender		
Male	350	58
Female	250	42
Age (years)		
Younger than 65	234	39
65 or older	366	61
Ethnicity		
Caucasian	566	94
Other	34	6
Marital status		
Married	443	74
Not married	157	26
Education level		
Completed high school or less	296	49
Some postsecondary or more	304	51
Household income (Canadian \$)		
59,999 or less	314	52
60,000 or more	214	36
No response	72	12
Employment status		
Employed	183	31
Not employed	417	70
Body mass index		
Less than 25	203	34
25–29.9	259	43
30 or greater	138	23
lime since diagnosis (years)	160	
Less than five	460	17
Five of more	100	1/
Surgery	40	/
Voc	502	00
No	392	35 1
Chemotherany	0	1
Vec	333	56
No	267	45
Presence of an ostomy	207	15
Yes	81	14
No	519	87
Current disease status	0.0	0,
Disease free	457	76
Existing disease	72	12
No response	71	12
•		

Note. Because of rounding, not all percentages total 100.

in the neighborhood. The largest difference based on current PA showed that CRC survivors who were not meeting the PA guidelines were less likely to have a fitness membership, less likely to prefer doing PA at a community fitness center, and less likely to prefer to receive PA information via e-mail.

The largest associations between PA preferences and medical variables found that survivors within 60 months of diagnosis were less likely to prefer to start a PA program post-treatment, survivors with an ostomy were less likely to prefer doing PA at a community fitness center, survivors who experienced a cancer recurrence were more interested in a PA program to increase their

# Discussion

The primary purpose of the study was to examine the PA preferences of a population-based sample of CRC survivors. Results revealed that despite low PA participation rates, the majority of CRC survivors expressed definite or possible interest in receiving PA information and participating in a PA program. Most participants also indicated that they felt able to participate in a PA program designed for CRC survivors. These findings are similar to other studies of cancer survivor groups that reported high levels of interest in PA following cancer diagnosis (Bélanger et al., 2012; Jones & Courneya, 2002a; Karvinen et al., 2006, 2007; Stevinson et al., 2009), and suggest a desire for the availability of PA programming and counseling services for cancer survivors.

From the choices available, participants most frequently indicated a preference to receive PA information from a fitness specialist from a cancer center. The oncologist was the second most common preference identified by CRC survivors. That finding is higher than results reported for other survivor groups, such as bladder (21%) (Karvinen et al., 2007), endometrial (19%) (Karvinen et al., 2006), young adult (17%) (Bélanger et al., 2012), breast (9%) (Rogers, Markwell, et al., 2009) and mixed cancer survivors (10%) (Jones & Courneya, 2002a), suggesting that oncologists may play an important role in delivering PA counseling for CRC survivors. In a survey study, Jones and Courneya (2002b) found that about 82% of cancer survivors identified that they would prefer that their oncologist initiate a discussion about exercise; however, only about 28% of cancer survivors reported having a conversation about exercise that was initiated by their oncologist. The feasibility of oncologists offering PA counseling services is unclear.

Interestingly, only 12% of CRC survivors preferred to receive PA counseling from nurses in this study, despite the fact that they may be in a better position to provide PA counseling because of their role on the oncology team. That finding is similar to other cancer survivor studies (Karvinen et al., 2006, 2007; Trinh et al., 2011), and suggests that CRC survivors may not perceive nurses as

#### Table 2. Preferences for Physical Activity (PA) Counseling and Programming Among Colorectal Cancer (CRC) Survivors (N = 600)

Variable	n	%
PA Counseling		
Interested in PA information after diagnosis		
Yes	380	63
No	72	12
Maybe	134	22
No response	14	2
Preferred source of PA information <sup>a</sup> ( $N = 563$ )	266	47
Oncologist	200	4/
Physiotherapist at the cancer center	134	25
Nutritionist from the cancer center	138	25
CRC support group	115	20
Fitness expert from the community	102	18
Nurse	69	12
Preferred medium for PA information <sup>b</sup> ( $N = 571$ )		
Brochures or other print materials	359	63
Face-to-face	232	41
Self-help video	134	24
Via e-mail	130	23
On the Internet	96	17
lelephone	58	10
PA Programming		
Able to do a PA program for CRC survivors ( $N = 580$ )		
Yes	290	50
No	92	16
Maybe	198	34
No response		
Willingness to do a PA program for CRC survivors	224	20
No	23 <del>4</del> 118	20
Maybe	230	38
No response	18	3
Preferred timing to start a PA program	10	5
At the time of diagnosis	112	19
During treatment	53	9
Immediately after treatment	133	22
3–6 months after treatment	167	28
At least one year after treatment	65	11
No response	70	12
Preferred venue for a PA program <sup>a</sup> ( $N = 574$ )		
At home	320	56
Outside around my neighborhood	22/	40
At a community fitness center	160	28
At a cancer center	59	10
Yes	76	13
No	512	85
No response	12	2
Access to the Internet	•-	-
Yes	368	61
No	225	38
No response	7	1
(Continued	l on the next	nage)

<sup>a</sup> Asked to select one response but several CRC survivors selected multiple responses. These multiple responses were included.

<sup>b</sup> Could select more than one response

<sup>c</sup> Could list more than one piece of exercise equipment

Note. Because of rounding, percentages may not total 100.

#### Table 2. Preferences for Physical Activity (PA) Counseling and Programming Among Colorectal Cancer (CRC) Survivors (*Continued*) (N = 600)

Variable % n PA Programming (Continued) Interest in a program to increase activity level Yes 282 47 No 86 14 208 35 Maybe 24 4 No response Preferred training partner for PA 143 24 Alone Family or friends 132 22 71 12 Other cancer survivors No preference 194 32 Combination 33 6 27 5 No response Favorite activity in the winter 221 37 Walking or hiking 5 Team sports (e.g., curling, hockey) 32 5 Skiing or snowboarding 29 20 3 Swimming Other 153 26 145 24 No response Favorite activity in the summer 291 49 Walking or hiking Golfing 15 88 Gardening or yard work 45 8 Swimming 22 4 73 12 Other 81 14 No response Owns home exercise equipment 333 56 Yes No 256 43 2 No response 11 Common exercise equipment owned<sup>c</sup> (N = 300) 149 50 Treadmill Bike 115 38 Weights 107 36 Elliptical 19 6 Other (e.g., rower, stepper, resistance bands) 14 41

<sup>a</sup>Asked to select one response but several CRC survivors selected multiple responses. These multiple responses were included.

<sup>b</sup> Could select more than one response

<sup>c</sup>Could list more than one piece of exercise equipment

Note. Because of rounding, percentages may not total 100.

having the necessary qualifications or expertise to provide PA information. Therefore, nurses may require extra training to convince cancer survivors that they have the required knowledge and expertise to promote PA.

The preferred method of delivery for PA information was through brochures or other print materials, followed by face-to-face. That pattern is consistent with previous research in kidney cancer survivors (Trinh et al., 2011). Nevertheless, face-to-face counseling has been identified as the most common preference among cancer survivors overall (Szymlek-Gay, Richards, & Egan, 2011). However, print materials have an advantage over face-to-face delivery because they have the potential to reach large numbers of cancer survivors. In addition, targeted print materials have been found to be effective for increasing PA in other cancer survivor groups (Vallance, Courneya, Plotnikoff, Yasui, & Mackey, 2007).

The majority of participants indicated that they preferred to start an exercise program post-treatment. Specifically, most participants indicated that they would have preferred to start an exercise program immediately after treatment, 3-6 months after treatment, or at least one year after treatment. Those results are similar to several other cancer survivor groups (Bélanger et al., 2012; Karvinen et al., 2006; Vallance et al., 2006). Interestingly, 19% of CRC survivors identified that they would have preferred to start a PA program at the time of diagnosis, suggesting the potential importance of pretreatment PA counseling, an underexplored research domain that has the potential to help patients with cancer physically and emotionally cope with treatment through symptom management (Courneya & Friedenreich, 2007).

CRC survivors had no preference for who to do PA with, followed by wanting to be physically active alone, and with family or friends. Preference for doing PA alone has been found for kidney (Trinh et al., 2011), bladder (Karvinen et al., 2007), ovarian (Stevinson et al., 2009), endometrial (Karvinen et al., 2006), mixed (Jones & Courneya, 2002a), and head and neck cancer survivors (Rogers, Malone, et al., 2009). Based on the preferences identified by CRC, offering group-based and individual PA programs may be optimal.

More than half of CRC survivors in this study identified a preference for engaging in a homebased PA program. That result is similar to previous cancer studies (Gjerset et al., 2011; Jones et al., 2007; Jones & Courneya, 2002a; Karvinen et al., 2007; Rogers, Malone, et al., 2009; Rogers, Markwell, et al., 2009; Stevinson et al., 2009; Trinh

et al., 2011; Vallance et al., 2006) and emphasizes the importance of developing PA programs that can be performed without supervision and with little equipment. However, home-based PA programs may not be ideal for inactive and inexperienced cancer survivors. Hence, a PA program designed for CRC survivors may include a supervised component initially to demonstrate proper exercise techniques, followed by a home-based program.

Walking was identified as the preferred PA modality for winter and summer. That finding is consistent with other cancer survivor groups (Gjerset et al., 2011; Jones et al., 2007; Jones & Courneya, 2002a; Karvinen et al.,

# Table 3. Associations Between Demographics and Medical Variables and Physical Activity (PA) Preferences in Colorectal Cancer (CRC) Survivors

Survivor Group	Preference	Association	χ²	р
Older than 65 versus younger than 65	Less likely to prefer receiving PA information by e-mail More likely to have no preference for who to do PA with Less likely to prefer doing PA outside in the neighborhood Less interested in a PA program to increase their PA level Less likely to have Internet access	17% versus 31% 37% versus 29% 34% versus 48% 43% versus 58% 47% versus 85%	13.6 4 10 11.8 83.7	< 0.001 0.047 0.002 0.003 < 0.001
Female versus male	More likely to prefer to receive PA information from bro- chures or other print materials Less likely to prefer doing PA alone More likely to prefer walking Less likely to have Internet access	71% versus 56% 19% versus 29% 69% versus 47% 56% versus 66%	12.6 6.8 23.9 7.5	< 0.001 0.009 < 0.001 0.028
Married versus unmar- ried	More interested in receiving PA information following CRC diagnosis Less likely to prefer to start PA post-treatment More likely to prefer doing PA with family and friends Less likely to prefer to do PA at a cancer center More likely to have exercise equipment at home More likely to have Internet access	67% versus 59% 66% versus 77% 26% versus 16% 8% versus 18% 62% versus 42% 68% versus 45%	9.1 5.6 5.5 11.2 18.2 26.2	0.011 0.018 0.019 < 0.001 < 0.001 < 0.001
Completed high school or less versus some postsecondary educa- tion	Less likely to prefer to receive PA information on the Internet Less likely to prefer doing PA outside in the neighborhood More likely to prefer doing PA at home Less likely to prefer doing PA at a community fitness center Less interested in a PA program to increase their PA level Less likely to have Internet access	12% versus 22% 34% versus 45% 62% versus 50% 21% versus 35% 79% versus 91% 47% versus 76%	9.9 6.4 9.1 12.9 14.5 57	0.002 0.011 0.003 < 0.001 < 0.001 < 0.001
Annual income less than \$59,999 versus more than \$60,000 (Canadian)	Less interested in receiving PA information from a fitness expert at a cancer center More likely to prefer to receive PA information from bro- chures or other print materials Less likely to prefer to receive PA information on the Internet	44% versus 54% 68% versus 59% 12% versus 26%	4.9 4.7 14.3	0.027 0.03 < 0.001
	Less interested in receiving information about PA following cancer diagnosis Less likely to prefer to start PA post-treatment Less likely to prefer doing PA at a community fitness center Less interested in a PA program to increase their PA level More likely to have Internet access	61% versus 76% 35% versus 64% 24% versus 34% 34% versus 57% 52% versus 84%	14.2 4.6 5.8 6.3 53	< 0.001 0.032 0.016 0.043 < 0.001
Employed versus unemployeed	More likely to feel able to do a PA program for CRC survivors More interested in receiving PA information from a fitness expert at a cancer center More likely to prefer to receive PA information on the Internet More likely to prefer to receive PA information by e-mail More likely to prefer doing PA outside in the neighborhood More interested in a PA program to increase their PA level More likely to have Internet access More likely to prefer doing PA with family and friends	61% versus 45% 54% versus 44% 26% versus 13% 32% versus 19% 51% versus 34% 57% versus 46% 84% versus 52% 32% versus 19%	13.1 3.9 15.3 12.6 13.2 7.1 59.7 9.7	0.004 0.048 < 0.001 < 0.001 < 0.001 0.029 < 0.001 0.002
Not meeting public health PA guidelines versus those who are	Less likely to prefer doing PA outside in the neighborhood Less likely to have Internet access Less interested in doing a PA program for CRC survivors Less interested in receiving PA information from a fitness expert at a cancer center Less interested in receiving PA information following CRC diagnosis More likely to prefer walking More likely to prefer doing PA at home More interested in a PA program to increase their PA level	35% versus 48% 55% versus 83% 36% versus 49% 44% versus 54% 77% versus 85% 61% versus 47% 60% versus 47% 58% versus 45%	9.1 23.8 10.8 5.6 4.9 10.81 8.7 9.1	0.003 < 0.001 0.005 0.018 0.027 < 0.001 0.003 0.011
Currently receiving cancer treatment versus not currently receiving treatment	More likely to prefer to receive PA information from a nurse Less likely to prefer doing PA at a cancer center	23% versus 12% 4% versus 14% (Cor	4.7 3.9 ntinued on th	0.031 0.049 e next page)

# Table 3. Associations Between Demographics and Medical Variables and Physical Activity (PA) Preferences in Colorectal Cancer (CRC) Survivors (Continued)

Survivor Group	Preference	Association	χ²	р
Ostomy versus no ostomy	More interested in receiving PA information from a phys- iotherapist	35% versus 23%	4.9	0.027
	More interested in receiving PA information from a nutri- tionist	37% versus 23%	7.5	0.006
	Less likely to prefer to receive PA information from bro- chures or other print materials	51% versus 65%	4.8	0.029
	Less likely to have a fitness membership	4% versus 15%	7.3	0.007
Experienced a recurrence versus no recurrence	More interested in receiving information about PA following cancer diagnosis	78% versus 64%	10.2	0.038
	More interested in doing a PA program for CRC survivors	62% versus 39%	15.8	0.003
	More likely to prefer doing PA at a cancer center	20% versus 9%	6.3	0.043
Disease-free versus	Less likely to feel able to do a PA program for CRC survivors	39% versus 51% 23% versus 12%	11 59	0.012
existing discuse		25/6 (01503 12/0		0.001

2007; Rogers, Malone, et al., 2009; Stevinson et al., 2009; Trinh et al., 2011; Vallance et al., 2006), and has been identified as a preferred activity for older adult cancer survivors. Walking programs are a promising intervention to increase PA levels in CRC survivors because they can be implemented successfully in a home-based setting and require little cost, equipment, and supervision.

Age, education, annual family income, and current PA were the demographic variables most consistently associated with PA preferences. Specifically, older adult CRC survivors were less interested in engaging in a PA program and less interested in a PA program to increase their PA level, which is not surprising because older CRC survivors may have comorbidities that prevent or limit PA participation. That finding is similar to other cancer survivor groups (Gjerset et al., 2011; Jones et al., 2007; Jones & Courneya, 2002a; Karvinen et al., 2007; Rogers, Malone et al, 2009; Stevinson et al., 2009; Trinh et al., 2011; Vallance et al., 2006). Older CRC survivors also were less likely to prefer doing a PA program outside in the neighborhood, which is consistent with older cancer survivor groups who prefer home-based PA programs (Gjerset et al., 2011; Jones & Courneya, 2002a; Jones et al., 2007; Karvinen et al., 2007; Rogers, Malone, et al., 2009; Stevinson et al., 2009; Trinh et al., 2011; Vallance et al., 2006).

CRC survivors with less education were less interested in a PA program to increase PA levels and a PA program for CRC survivors, suggesting that they may be less aware of the benefits of PA. Differences also were observed for preferred location of PA, where CRC survivors with less education were less likely to prefer doing PA at a cancer center, outside in the neighborhood, or in a community fitness center, and were more likely to prefer doing PA at home. Those results suggest that CRC survivors with less education may feel self-conscious about engaging in PA in the presence of others and would prefer to take part in a PA program in the comfort of their own home. CRC survivors with a lower annual income were less likely to feel able to do a PA program and less interested in a PA program to increase PA levels. Differences for preferred location established that CRC survivors with lower annual income were less likely to prefer doing PA outside in the neighborhood and less likely to prefer doing PA at a community fitness center. The results demonstrate that CRC survivors with lower annual income may feel that they do not have the financial resources to spend on a PA program, and may not be aware of the benefits of PA.

Smaller differences were observed for the associations between medical variables and PA preferences in CRC survivors. Survivors with an ostomy were less likely to have a fitness membership and less likely to prefer doing PA at a community center. The presence of an ostomy may make exercising in public more difficult or even embarrassing, and reflect the unique social and psychological challenges that CRC survivors with ostomies may face when engaging in a PA program. CRC survivors who experienced a recurrence were more interested in receiving information about PA following cancer diagnosis, doing a PA program for CRC survivors, doing PA to increase PA levels, and doing their PA at a cancer center. Therefore, these survivors may be interested in a PA program to manage their cancer and treatment side effects and help them return to a normal lifestyle by improving physical and psychological health. Based on these results, demographic and medical factors seem to influence CRC survivor PA preferences. To optimize adherence, health- and disease-related outcomes, and long-term behavior change, PA programs designed for CRC survivors need to incorporate these preferences.

Finally, CRC survivors who were not meeting public health PA guidelines were more interested in a PA program to increase PA levels, as well as more likely to prefer walking and doing PA at home. Because a large majority of CRC survivors are inactive, a home-based program may not be the most feasible, demonstrating the potential for interventions that incorporate a structured component early in the PA program and then taper into a home-based program. In addition, CRC survivors who were not meeting public health PA guidelines were less likely to prefer doing PA at a community fitness center, as well as less interested in receiving PA information following CRC diagnosis and from a fitness expert at a cancer center. These results provide an indication of the potential challenges facing interventionists trying to promote PA in CRC survivors.

### **Strengths and Limitations**

The current study has several important strengths and weaknesses. To the best of the authors' knowledge, this study is the first to explore PA program and counseling preferences in a sample of CRC survivors. In addition, the study included a large, random, population-based sample of CRC survivors from the ACR in Alberta, Canada. Limitations include the self-report measures of PA and medical variables, self-selection of CRC survivors who may be more interested in PA participation, and a modest response rate.

## **Implications for Nursing**

The current study has several important implications for cancer nursing. The findings suggest that CRC survivors would like to receive PA counseling services tied closely to their cancer center. Although only a small percentage of CRC survivors identified that they would like to receive PA information from nurses, nurses may have a better opportunity to provide effective educational information with regard to PA promotion because of their close involvement and interaction with their patients. Therefore, understanding CRC survivor PA preferences may allow nurses to provide accurate recommendations to enhance motivation, adherence, and health outcomes.

## Conclusion

The results of this study indicate that CRC survivors have an interest in receiving PA programming and counseling. CRC survivors indicated a preference for starting a home-based walking PA program following treatment, alone or with friends and family. Several of these preferences were influenced by age, education, annual family income, and current PA levels. Those demographic variables must be considered when developing PA interventions for CRC survivors. Overall, these findings are important because they provide valuable information needed to design target PA programs for CRC survivors. Targeting PA interventions to PA programming preferences for CRC survivors may lead to improved PA participation, quality of life, and even disease outcomes.

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