

An evaluation of the behaviour-change techniques used on Canadian cancer centre Web sites to support physical activity behaviour for breast cancer survivors

B.D. Sylvester PhD,* K. Zammit,* A.J. Fong MSc,* and C.M. Sabiston PhD*

ABSTRACT

Background Cancer centre Web sites can be a useful tool for distributing information about the benefits of physical activity for breast cancer (bca) survivors, and they hold potential for supporting health behaviour change. However, the extent to which cancer centre Web sites use evidence-based behaviour change techniques to foster physical activity behaviour among bca survivors is currently unknown. The aim of our study was to evaluate the presentation of behaviour-change techniques on Canadian cancer centre Web sites to promote physical activity behaviour for bca survivors.

Methods All Canadian cancer centre Web sites ($n = 39$) were evaluated by two raters using the Coventry, Aberdeen, and London–Refined (CALO-RE) taxonomy of behaviour change techniques and the eEurope 2002 Quality Criteria for Health Related Websites. Descriptive statistics were calculated.

Results The most common behaviour change techniques used on Web sites were providing information about consequences in general (80%), suggesting goal-setting behaviour (56%), and planning social support or social change (46%). Overall, Canadian cancer centre Web sites presented an average of $M = 6.31$ behaviour change techniques (of 40 that were coded) to help bca survivors increase their physical activity behaviour. Evidence of quality factors ranged from 90% (sites that provided evidence of readability) to 0% (sites that provided an editorial policy).

Conclusions Our results provide preliminary evidence that, of 40 behaviour-change techniques that were coded, fewer than 20% were used to promote physical activity behaviour to bca survivors on cancer centre Web sites, and that the most effective techniques were inconsistently used. On cancer centre Web sites, health promotion specialists could focus on emphasizing knowledge mobilization efforts using available research into behaviour-change techniques to help bca survivors increase their physical activity.

Key Words Behaviour change techniques, online tools, breast cancer, physical activity, Web sites

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BACKGROUND

Breast cancer (bca) is the most common cancer diagnosis for women in Canada¹. Although survival rates are approaching 88%¹, many women with bca still live with debilitating physical and psychological effects². Physical activity is a safe, feasible, and effective way to help mitigate the physical and psychological side effects of cancer^{3–6}. For example, some of the benefits of physical activity for

bca survivors include increased quality of life, improved cardiorespiratory fitness, decreased fatigue, reduced bca and all-cause mortality, decreased treatment-related fatigue, and improved mental health (for example, lower rates of self-reported anxiety and depressive symptoms)^{3,5,6}. Despite the well-known benefits of physical activity for bca survivors, as many as 90% of survivors are physically inactive^{7–10}. That knowledge-to-action research gap is worthy of research attention^{11,12}.

Correspondence to: Catherine Sabiston, Faculty of Kinesiology and Physical Education, University of Toronto, 55 Harbord Street, Toronto, Ontario M5S 2W6.
E-mail: catherine.sabiston@utoronto.ca ■ DOI: <https://doi.org/10.3747/co.24.3703>

Researchers have identified the necessity of efforts to translate scientific knowledge about cancer survivorship into practice¹². Although evidence-based guidelines for physical activity for bca survivors have been published^{13–15}, research is needed to examine whether translation of scientific evidence about physical activity is being delivered to bca survivors. Translation of evidence could be limited to information about physical activity guidelines, but might also include specific strategies to help more bca survivors to become more active. Behaviour-change techniques (BCTs) are a systematic set of “active ingredients” that can be used to change behaviour^{16,17} and to facilitate physical activity behaviour in bca survivors¹⁸. Behaviour-change techniques include various strategies to change behaviour such as setting goals, action planning, and setting graded tasks, with one of the most effective identified strategies being self-monitoring¹⁶. It is important to understand how this type of information is transmitted to the target population.

The Internet can be one medium through which physical activity information and BCTs are offered to and sought by bca survivors^{19,20}. Internet platforms provide health resources for bca patients²¹, and an estimated 24% of bca patients seek health-related information online²². Cancer centre Web sites are therefore a promising method for distributing physical activity information to a large audience of bca survivors. Indeed, Valero-Aguilera *et al.*²³ showed that 78% of bca survivors search the Internet for information about health and exercising after their illness. Nonetheless, online information also presents some challenges. Anyone able to access the Internet can post information online, and therefore quality control and regulation of the information available is difficult. Inaccurate information—or accurate information used in improper situations—could lead to negative outcomes for patients^{24,25}. To aid bca survivors in critically assessing the information presented to them, site providers can adhere to quality assurance criteria (that is, criteria developed by specialists in the field²⁶). Specifically, by adhering to high quality standards, site providers can assist individuals in discerning accurate and trustworthy information from inaccurate or ambiguous information^{25,26}. For example, transparency with respect to the provider of the site, the purpose and objectives of the site, the target audience for the site, and sources of funding are relevant indicators of quality²⁶.

Web sites hosted by health care centres are a credible source of information to which bca survivors might turn for information about physical activity²⁵. For example, in a qualitative study examining the factors that affect decisions about physical activity, Sander and colleagues²⁵ found that decisions by bca survivors to engage (or not to engage) in physical activity or to increase physical activity after treatment were influenced by perceived inaccurate information or a lack of information about lymphedema and safe resistance exercise practices provided on the Internet and by health care providers. As a result, online information and the perception of the information provider (such as a health care provider) as credible can influence the future behaviour of bca survivors.

One credible information source is Canadian cancer centres. Cancer centre Web sites offer information

related to treatment and physical activity for bca survivors that might help patients to improve their physical activity behaviour. However, no formal evaluations have been conducted of the physical activity material posted for bca survivors on Canadian cancer centre Web sites. An evaluation of the posted information pertaining to physical activity, including general information and strategies for implementing changes in physical activity behaviour, is therefore worthwhile. Specifically, it would be valuable to understand which BCTs¹⁷ are used online for bca survivors.

The purpose of the present study was to identify the BCTs published at Canadian cancer centre Web sites containing information about physical activity behaviour for bca survivors, and to evaluate the quality of those Web sites using the eEurope quality criteria protocol. To that end, we first sought to determine the prevalence of specific physical activity information relevant to bca survivors, such as information about physical activity guidelines²⁷ and the effects of sedentary behaviour^{28–30}, and the visual representations of bca survivors^{31,32}, to gain a sense of the potential knowledge translation gap.

Although physical activity and sedentary behaviour in bca survivors are not specifically BCTs, we sought to examine that information because it is relevant for behaviour change with respect to physical activity for bca survivors. Canadians who are aware of physical activity guidelines are more active than their unaware counterparts³³. Cancer survivors are more sedentary than people without cancer²⁸, and sedentary behaviour is associated with lower quality of life and higher rates of mortality in cancer survivors²⁹. Furthermore, providing tailored information for bca survivors is beneficial for increasing physical activity³⁴, and the presence of physical activity guidelines, cautions against sedentary behaviour, and visual representations provides additional insight into whether contemporary, tailored knowledge about physical activity behaviour is being translated to bca survivors by Canadian cancer centre Web sites.

METHODS

Cancer Centre Web Site Search and Identification

All cancer centres were identified through an Internet search of Canadian cancer-specific Web sites (for example, the Canadian Cancer Society, Cancer Care Ontario) to locate cancer centre Web sites for bca survivors. As a purposeful sampling strategy, only cancer centres with a radiation therapy department were included in the evaluation. The identified Web sites were then categorized as either centre-specific (a unique cancer centre Web site hosted by the cancer centre—for example, the Cancer Centre of Southeastern Ontario at Kingston General Hospital) or centralized (a single Web site for the given district or province, which houses all the information provided to bca survivors—for example, CancerCare Manitoba).

Procedure

An exhaustive search at each cancer centre Web site was performed to identify all available physical activity information for cancer survivors. The material was reviewed and coded by two trained coders using the Coventry, Aberdeen,

and London–Refined (CALO-RE) taxonomy of behaviour change techniques¹⁷ and the eEurope 2002 quality criteria for health-related Web sites (transparency and honesty, authority, updating of information, and accountability were retained)²⁶. Specifically, coders first manually searched the Web sites for information about physical activity for bca survivors (for example, Web pages about improving sleep, managing symptoms, and so on), and then used the electronic search function available at cancer centre Web sites to explore pages that might have been missed (that is, by using key words such as “physical activity and breast cancer” or “exercise and breast cancer”). The results obtained from the electronic search were reviewed to find any additional Web page links that led to information about physical activity and bca.

English and French Web sites were both coded between February 2016 and July 2016. In line with the study objectives to evaluate BCTs related to physical activity for bca survivors, information about general physical activity that was not specific to cancer or bca survivors was excluded. Furthermore, information that was provided through a link from the main cancer centre’s Web site to a Web site hosted by another entity (for example, Cancer Care Ontario) was also excluded.

Items Coded

To support study objectives, items providing physical activity information relevant to bca survivors, such as physical activity guidelines, effects of sedentary behaviour, and visual representations of bca survivors were coded. With respect to physical activity information, we coded for the presence of any physical activity information offering; where information was offered, we also coded for explicit mentions of physical activity guidelines. Information about sedentary behaviour was evident if explicitly mentioned in any capacity (for example, “avoid sedentary behaviour for prolonged periods of time”). Visual representations of bca survivors were considered to be present if photos or videos demonstrated variability in women (for example, age, ethnicity), side effects from treatment (for example, fatigue, hair loss), or variation in physical ability (for example, walking or stretching modifications). Table 1 presents further details of the physical activity information coded.

The CALO-RE taxonomy of BCTs¹⁷ is a 40-item set of techniques providing standardized common terms to understand how and why interventions work to change physical activity behaviour. The CALO-RE taxonomy of BCTs from Michie *et al.*¹⁷ was used in the present study because it provides a reliable and systematic method of identifying evidence-based techniques that are specific to improving physical activity behaviour. Michie *et al.* define terms that serve as a reference guide for each technique and explain the conceptual uniqueness of each one. Table 11 briefly describes the BCTs coded. (For in-depth details of each technique, see Michie *et al.*¹⁷)

Quality criteria were derived from the eEurope quality criteria for health-related Web sites²⁶ and include five key criteria with respect to evidence. “Transparency and honesty” refers to clearly identifying the organization responsible for the site, the purpose and objectives of the site,

the target audience, and all sources of funding for the site. “Authority” refers to identifying sources of information, the publication dates of the sources, the credentials of the information providers, and the dates that the credentials were received. “Updating of information” refers to clear and regular updates to the site such that visitors can assess the extent to which the information is current. “Accountability” refers to identification of responsible and appropriate oversight, trustworthy partners, and an editorial policy that describes the procedures used for content selection. “Accessibility” refers to the ease with which information can be found (“findability”) and searched (“searchability”) and also to whether the information is easily understood, clearly presented, and appropriate for the target audience (“readability”). “Accessibility” also includes the ease of site use (“usability”). Details about the quality criteria items can be found in the descriptions in Table 11 and the eEurope quality criteria guidelines²⁶.

Data Analysis

Descriptive statistics (for example, frequencies, proportion of sites) were calculated to determine the frequency of each BCT, the quality criteria met by the information provided, and the frequency and type of physical activity information offered at centre-specific and centralized cancer hospital Web sites. Inter-rater reliability was calculated to estimate the consistency between the two coders. Specifically, the Cohen kappa coefficient³⁶ was calculated in the IBM SPSS Statistics software application (version 24; IBM, Armonk, NY, U.S.A.) by comparing the observed agreement and the probability of chance agreement for each Web site.

RESULTS

The 69 Canadian cancer centres that met the inclusion criteria were located in Ontario ($n = 14$), British Columbia ($n = 6$), Alberta ($n = 17$), Saskatchewan ($n = 2$), Manitoba ($n = 4$), Quebec ($n = 20$), New Brunswick ($n = 2$), Nova Scotia ($n = 2$), Newfoundland and Labrador ($n = 1$), and Prince Edward Island ($n = 1$). The Web sites were categorized as either belonging to specific centres ($n = 29$, which included cancer centres in Ontario, Quebec, Newfoundland, New Brunswick, and Nova Scotia) or being centralized sites ($n = 10$, which included cancer centres in British Columbia, Alberta, Saskatchewan, Manitoba, Prince Edward Island, and Quebec). Given that centralized Web sites often covered physical activity information for multiple specific cancer centres, only 39 of the 69 identified Web sites were coded (29 in English and 10 in French). The calculated Cohen kappa coefficient for the two coders was 0.87.

Physical Activity Information

As reported in Table 1, general physical activity guidelines for adults were included in 11 of the 29 centre-specific Web sites (38%) and in 7 of the 10 centralized Web sites (70%). Sedentary behaviour was discussed by fewer than 50% of the Web sites. Visual representations of bca survivors at various stages, with varying side effects, and with different physical abilities, were present in 20% or fewer of centre-specific Web sites and were not present at all in centralized Web sites.

TABLE I Physical activity information for breast cancer survivors provided by Canadian cancer centre Web sites

Information	Centre-specific (n=29)		Centralized (n=10)	
	(n)	(%)	(n)	(%)
<i>Physical activity</i>				
Is exercise or physical activity information offered?	24	83	10	100
Inclusion of physical activity guidelines (for example, ACSM guidelines)	11	38	7	70
<i>Sedentary behaviour</i>				
Inclusion of general information about sedentary behaviour (for example, consequences, norms of asymptomatic population, research, etc.)	4	14	3	30
Inclusion of any tools or tips to decrease time spent in sedentary behaviour	2	7	3	30
Inclusion of evidence-based tips or tools to decrease time spent in sedentary behaviour	1	3	1	10
<i>Visual representation of breast cancer survivors</i>				
Survivors at various stages of survivorship trajectory (that is, is it apparent that these women are at different stages?)	2	7	0	0
Images of survivors with apparent side effects from treatment	3	10	0	0
Images of survivors with different physical abilities	2	7	0	0

ACSM = American College of Sports Medicine.

BCTs

Overall, cancer centre Web sites presented a mean of 6.31 ± 5.79 BCTs. The centre-specific Web sites presented a mean of 6.14 ± 6.21 BCTs, and the centralized Web sites presented a mean of 9.90 ± 4.72 BCTs. The most frequent BCTs used at centre-specific Web sites (Table II) were to provide information about consequences (of physical activity) in general (76%), goal-setting behaviour (52%), barrier identification or problem-solving (41%), and planning social support or social change (38%). The top centralized Web sites most frequently presented these BCTs: providing information about (physical activity) consequences in general (90%), providing information about consequences to the individual (80%), goal-setting behaviour (70%), and planning social support or social change (70%).

Web Site Quality

Many cancer centre Web sites (69%) did not regularly update the information presented at the site (31% of sites included a statement about regular updates to their site). Some government sources of funding were evident at the sites (for example, the BC Cancer Agency in partnership with the provincial health services authority); however, almost two thirds of the sites (62%) did not specify the source of the funding for their physical activity Web page. Compared with centre-specific Web sites, centralized Web sites scored higher on aspects of accessibility such as findability (63% vs. 53%); in contrast, centralized Web sites scored lower on searchability (50% vs. 66%). Table III reports the frequency with which evidence supporting the quality items identified in the Quality Criteria for Health Related Websites were coded.

DISCUSSION AND CONCLUSIONS

Most bca survivors are physically inactive, and successful strategies to increase their physical activity behaviour are

necessary^{8,9}. In the present study, cancer centre Web sites were examined to determine the prevalence with which BCTs were used to convey physical activity information to bca survivors. Overall, Canadian cancer centre Web sites incorporate evidence-based BCTs; however, fewer than 20% of the BCTs identified by Michie *et al.*¹⁷ were evident. Furthermore, the quality criteria that were most evident at the cancer centre Web sites were evidence of transparency and honesty (for example, transparency of the purpose and objectives of the site, and indication of the target audience); the least-evident quality criteria were evidence of accountability (for example, stating an editorial policy). Overall, cancer centre Web sites were found to provide few BCTs relating to physical activity information for bca survivors, and the quality criteria evident on the Web sites could be improved.

Although physical activity information was offered by 83% of centre-specific Web sites and 100% of centralized Web sites, only 38% of centre-specific and 70% of centralized Web sites included physical activity guidelines. Despite the recent development of such guidelines for Canadian adults, cancer survivors^{13,14}, and bca survivors¹⁵, more than half the cancer centre Web sites (54%) included no physical activity guidelines. Although identifying physical activity guidelines is not necessary for promoting physical activity behaviour, and although including physical activity information is better than not including it, the lack of recognition of guidelines represents a missed opportunity to disseminate tailored, appropriate, and health-promoting research to bca survivors. Greater knowledge translation efforts to share the physical activity guidelines with bca survivors could be advantageous in increasing physical activity behaviour^{27,33}.

Finally, information about the effects of sedentary behaviour and visual representations of bca survivors were also infrequent on cancer centre Web sites that provided physical activity information for bca survivors. Research

and information about the consequences of sedentary behaviour is a relatively new area of research, but has been gaining traction²⁹. Given the amount of time that cancer survivors spend engaged in sedentary behaviour²⁹ and the link between visual representation, body image, and motivation to participate in physical activity^{31,32}, it seems prudent to present such information for bca survivors. Visual representations of bca survivors should increase on cancer centre Web sites as knowledge and interest about the visual components of health information and communication increase³¹.

Relatively few of the coded bcts were used to convey information about how bca survivors can make positive physical activity behaviour changes. Specifically, of the 40 possible bcts, cancer centre Web sites contained, on average, approximately 6 (that is, 15% of possible techniques). Although the optimal number of bcts presented for improving physical activity in bca survivors is unknown, cancer centre Web sites and lifestyle behaviour interventions¹⁶ both included approximately 6 bcts. Research to identify the optimal number (or range) of bcts presented at a Web site to help bca survivors increase their physical

TABLE II Prevalence of behaviour change techniques for physical activity provided by cancer centre-specific and centralized Web sites

Behaviour change technique ^a	Web site provides the technique			
	Centre-specific (n=29)		Centralized (n=10)	
	(n)	(%)	(n)	(%)
Provide information about consequences in general	22	76	9	90
Goal setting (behaviour)	15	52	7	70
Plan social support or social change	11	38	7	70
Barrier identification or problem solving	12	41	5	50
Action planning	10	34	6	60
Goal setting (outcome)	10	34	5	50
Set graded tasks	9	31	6	60
Provide information on where and when to perform the behaviour	10	34	4	40
Provide information of consequences to the individual	4	34	8	80
Provide instruction on how to perform the behaviour	6	21	6	60
Relapse prevention or coping planning	6	21	3	30
Prompt self-monitoring of behaviour	6	21	3	30
Environmental restructuring	5	17	4	40
Prompt practice	6	21	2	20
Model or demonstrate the behaviour	5	17	3	30
Prompt review of outcome goals	5	17	2	20
Prompt review of behavioural goals	4	13	2	20
Prompting generalization of a target behaviour	4	13	2	20
Stress management or emotional control training	3	10	3	30
Time management	3	10	3	30
Provide normative information about the behaviour of others	2	7	3	30
Prompt rewards contingent on effort or progress toward the behaviour	3	10	0	0
Prompt self-monitoring of behavioural outcomes	2	7	0	0
Provide rewards contingent on successful behaviour	1	3	1	10
Provide feedback on performance	1	3	1	10
Teach to use prompts or cues	1	3	1	10
Facilitate social comparison	1	3	0	0
Prompt identification as role model or position advocate	0	0	1	10
Stimulate anticipation of future rewards	0	0	1	10

^a Techniques observed just once or not at all were Provide information about the approval of others, Prompt anticipated regret, Fear arousal, and General communication skills training. Techniques not observed in Canadian cancer Web sites included Shaping, Prompting focus on past success, Agree behavioural contract, Use of follow-up prompts, Prompt self-talk, Prompt use of imagery, and Motivational interviewing. The techniques presented in boldface type are effective for increasing physical activity behaviour (based on Williams *et al.*, 2011³⁵; Olander *et al.*, 2013³⁸; and Michie *et al.*, 2009¹⁶).

TABLE III eEurope 2002: quality criteria for health-related Web sites, centre-specific and centralized

Criterion	Ontario cancer centre web sites that meet the criterion			
	Centre-specific (n=29)		Centralized (n=10)	
	(n)	(%)	(n)	(%)
<i>Transparency and honesty</i>				
Transparency of purpose and objective of site	22	76	10	1.00
Target audience clearly defined	22	76	10	1.00
Transparency of all sources of funding for site (for example, government-funded)	12	41	3	25
<i>Authority</i>				
Clear statement of sources for all information provided and date of publication of source	17	59	4	25
Names and credentials of all providers of information put up on the site, including dates at which credentials were received	8	28	3	13
<i>Updating of information</i>				
Clear and regular updating of the site, with date of update clearly displayed for each page and item (as relevant); regular checking of relevance of information	6	21	6	63
Date of updates clearly displayed	10	56	6	83
<i>Accountability</i>				
Responsible partnering (that is, partnering and linking only with trustworthy individuals and organizations)	17	59	9	88
Editorial policy (that is, clear statement describing procedure used for content selection)	0	0	0	0
<i>Accessibility</i>				
Findability (that is, information can be easily found)	16	55	7	63
Searchability (that is, easy to search for information)	19	66	6	50
Readability (that is, information is easily understood, presentation and content are appropriate for target audience)	25	86	10	1.00
Usability (that is, ease of use of site)	23	79	6	50

activity is warranted. Moreover, outside the number of BCTs presented, questions remain about the quality of the BCTs that were evident.

A review of effective BCTs for increasing physical activity behaviours (and their frequency) in bca survivors does not, to our knowledge, exist; however, a few studies might provide insight. For example, in a review of effective BCTs used in physical activity interventions for asymptomatic adults, Williams and French³⁵ found that 6 techniques were significantly associated with higher physical activity behaviour. Specifically:

- Provide information about the consequences of the behaviour in general.
- Use action planning.
- Reinforce effort or progress toward the behaviour.
- Provide instruction.
- Facilitate social comparison.
- Teach time management.

An estimated 66% of women diagnosed with bca are obese³⁷, and in a recent systematic review and meta-analysis of obese individuals, Olander and colleagues³⁸ identified 21 BCTs that were associated with increased physical activity

behaviour through interventions. The most effective techniques for improving physical activity³⁸ were these:

- Teach the use of prompts or cues.
- Prompt practice.
- Prompt rewards contingent on effort.
- Reinforce effort or progress toward the behaviour.
- Facilitate social comparison.

Results from the foregoing reviews of both non-obese³⁵ and obese³⁸ adult populations show that 4 common BCTs are associated with an increase in physical activity:

- Provide information about the consequences of behaviour in general.
- Prompt rewards contingent on effort or on progress toward the behaviour.
- Provide instruction on how to perform the behaviour.
- Facilitate social comparison.

Finally, in a meta-regression, Michie and colleagues¹⁶ found that “prompt self-monitoring of behaviour” was the only BCT to be associated with increased physical activity behaviour. Those 5 efficacious techniques (from Olander

*et al.*³⁸, Williams *et al.*³⁵, and Michie *et al.*¹⁶) are highlighted in Table 11 to show how frequently they are being used at Canadian cancer centre Web sites. Overall, only 1 of the 5 most effective BCTs ("Provide information about consequences in general") was evident on more than 50% of Canadian cancer Web sites with physical activity information for bca survivors.

Furthermore, Amireault and colleagues³⁹ conducted a review of multiple health behaviour change interventions (for example, physical activity and healthy eating behaviours) for cancer survivors and found that the BCTs most frequently used for improving physical activity behaviours (for both theoretical and atheoretical interventions) were self-monitoring, goal-setting, providing feedback on behaviour performance, and providing information about the consequence of behaviours. In the present study, we found that providing information about the consequence of behaviours in general was evident on most (80% of) Canadian cancer Web sites with physical activity information for bca survivors and that goal-setting was evident on approximately half the sites (goal-setting behaviour was evident on 56% of Web sites, and goal-setting toward an outcome was evident on 38%). All other BCTs identified as "effective" by Amireault and colleagues³⁹ were evident on fewer than half the sites examined.

Efforts are needed to bridge the knowledge-to-action gap by incorporating effective techniques for increasing the physical activity behaviour of bca survivors. Research is warranted to further address the question of which BCTs might be the most effective and feasible to use on Canadian cancer Web sites to increase the physical activity behaviour of bca survivors.

Quality criteria with respect to transparency, honesty, and accessibility were evident on the Web sites, but consistent evidence of authority, updating of information, and accountability was lacking. Most Web sites did not include a clear statement describing the source of the information provided. No disclosure was made about how the physical activity information being presented had been selected. Furthermore, most Web sites did not show evidence of consistent updating to keep the site up-to-date with emerging evidence (only approximately 30% showed such evidence), and most did not identify the source of their information. In previous work^{40,41}, researchers found that approximately 30% of hosts of bca Web sites fail to identify the date the site was created or updated. However, providing evidence that a site is up to date could offer bca survivors an assurance of accurate (recent) information. Sander *et al.*²⁵ found that the decision by a bca survivor to engage (or not to engage) in physical activity after treatment was influenced by perceptions of inaccurate or missing information about lymphedema and safe resistance exercise practices provided on the Internet and through health care providers. The overall dearth of quality evidence (measured using quality criteria) could have a negative effect on physical activity levels among bca survivors.

Despite the insight gained from the current investigation, study limitations should be acknowledged. One limitation stems from the taxonomy that was used to code BCTs. The 40-item CALO-RE taxonomy was used¹⁷; however, other taxonomies have been defined (for example, the

93 BCTs identified by Michie *et al.*⁴²), and thus Web sites could include other BCTs that were not coded for the present study. Another limitation is the possibility that not all physical activity information on the Web sites was found during our search. For example, on one Canadian cancer centre Web site, some documents were password-protected for private access, and thus the study's Web site coders were prevented from viewing pages that might contain physical activity information for bca survivors. In addition, given the possibility of constant update of Web sites, physical activity information could have been added to or subtracted from coded Web sites during the time since our review. For example, during the coding process, hospitals in Quebec were undergoing a health care reform in which the flow of care was being restructured. As a result, centre-specific Web sites were beginning to transition to new centralized Web sites. That ongoing transition meant that only some of the hospitals had transferred their data to the new Web sites, which had implications for access, consistency of information presented, and findability of information. Our findings should be viewed as a snapshot that provides a first step in understanding the current state of physical activity information presented for bca survivors on Canadian cancer centre Web sites. Finally, and notably, we did not specifically search for information concerning physical activity guidelines, sedentary behaviour, and visual representations of bca survivors; we merely coded the Web pages that included information about physical activity behaviour. Researchers might wish to consider greater knowledge translation efforts to include recent evidence about sedentary behaviour and visual representations of bca survivors (that is, body image) on cancer centre Web sites.

Notwithstanding the limitations discussed, Canadian cancer centre Web sites are a promising medium for providing physical activity information to bca survivors. Evidence-based knowledge about physical activity behaviour change could be integrated into Canadian cancer centre Web sites to help bca survivors increase their physical activity behaviour.

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CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

AUTHOR AFFILIATIONS

*Faculty of Kinesiology and Physical Education, University of Toronto, Toronto, ON.

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