TBM

ORIGINAL RESEARCH

Evaluating the uptake of Canada's new physical activity and sedentary behavior guidelines on service organizations' websites

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ABSTRACT

New evidence-based physical activity and sedentary behavior guidelines for Canadians were launched in 2011. As a consequence, service organizations that promote physical activity directly to the public needed to change their promotion materials to reflect the new guidelines. Little is known about the rate at which service organizations adopt and integrate new evidence-based guidelines and determinants of guideline adoption. In this natural observational study, we evaluated the rate of online adoption of the new guidelines among key service organizations that promote physical activity and examined participation in a booster webinar as a supplemental dissemination strategy. One hundred fifty nine service organization websites were coded by one of six raters prior to the release of the new guidelines as well as at 3, 6, and 9 months after the release. Online adoption of the guidelines increased during the coding period with 51 % of organizations posting the guidelines or related information on their websites. Organizations' engagement in a webinar was associated with their adoption of the guidelines. The release of new Canadian Physical Activity and Sedentary Behaviour Guidelines led to increased guideline adoption on service organizations' websites. However, adoption was not universal. In order for the uptake of the new guidelines to be successful, further efforts need to be taken to ensure that service organizations present physical activity guidelines on their websites. Comprehensive, active dissemination strategies tailored to address organizational barriers are needed to ensure online guideline adoption.

KEYWORDS

Dissemination, Physical activity guidelines, Diffusion of innovations, Service organizations, Sedentary Behavior Guidelines

Implications

Practice: Extensive, tailored active dissemination strategies are recommended for enhancing adoption of physical activity and sedentary behavior guidelines among service organizations.

Policy: Mechanisms for funding the development of guidelines and their dissemination are needed.

Research: Our project provides other researchers methodology for evaluating the national uptake of a research innovation (e.g., policies and guidelines) at an organizational level.

BACKGROUND

Low levels of moderate- to vigorous-intensity physical activity and a high volume of sedentary behaviors are recognized as risk factors for chronic diseases and present significant threats to quality of life and longevity in most developed countries [1, 2]. Widely communicated age-appropriate guidelines are an important aspect of policy initiatives to promote physical activity and to reduce sedentary time [3, 4]. The communication and dissemination of such guidelines are facilitated through service organizations including governmental and nongovernmental organizations, public health units, medical organizations, research institutions, and health service organizations that promote physical activity directly to the public. Though some understanding exists about the role of organizational capacity in promoting physical activity [5, 6], little is known about how key service organizations adopt and integrate new evidence-based physical activity guidelines. One theory that may provide guidance is Rogers' diffusion of innovations theory [7] which seeks to explain how a new idea, practice, or object (innovation), such as a physical activity guideline, is spread through a social system over time (diffusion). This theory guided the current study evaluating the uptake of the new Canadian Physical Activity and Sedentary Behaviour Guidelines on service organizations' websites (see Table 1).

According to Rogers, diffusion occurs systematically such that organizations progress from learning about an innovation to integrating it into their practice [7]. The length of time an organization requires to progress through this innovation process is called the rate of adoption [7]. Specifically, rate of adoption refers to the relative speed that an innovation is adopted by organizations in a social system. Organ-

Table 1 | Comparison of the old versus new Canadian Physical Activity and Sedentary Behaviour Guidelines [9, 10]

	Old physical activity guidelines		New physical activity guidelines		Sedentary behavior guidelines	
	Age	Guideline	Age	Guideline	Age	Guideline
Child	6–9 years	Children should increase time currently spent on physical activity, starting with 30 min more per day and progress over 5 months to **90 min more per day**	5–11 years	For health benefits, children should accumulate at least **60 min of moderate- to vigorous-intensity physical activity daily**. This should include vigorous-intensity activities at least 3 days per week and activities that strengthen muscle and bone at least 3 days per week	5–11 years	For health benefits, children should minimize the time they spend being sedentary each day. This may be achieved by **limiting recreational screen time to no more than 2 h per day** and limiting sedentary (motorized) transport, extended sitting, and time spent indoors throughout the day
Youth	10–14 years	Youth should increase time currently spent on physical activity, starting with 30 min more per day and progress over 5 months to **90 min more per day**	12–17 years	For health benefits, youth should accumulate at least **60 min of moderate- to vigorous-intensity physical activity daily**. This should include vigorous-intensity activities at least 3 days per week and activities that strengthen muscle and bone at least 3 days per week	12–17 years	For health benefits, youth should minimize the time they spend being sedentary each day. This may be achieved by **limiting recreational screen time to no more than 2 h per day** and limiting sedentary (motorized) transport, extended sitting, and time spent indoors throughout the day
Adult	20–55 years	Accumulate 60 min of physical activity every day to stay healthy and improve your health. Engage in endurance activities to 4–7 days a week, flexibility activities 4–7 days a week, and strength activities 2–4 days a week	18–64 years	To achieve health benefits, adults should accumulate at least **150 min of moderate- to vigorous-intensity aerobic physical activity per week**, in bouts of 10 min or more. It is also beneficial to add muscle- and bone-**strengthening** activities using major muscle groups, at least **2 days per week**	18–64 years	Not available
Older Adults	55+years	Accumulate 30 to 60 min of moderate physical activity most days. Engage in endurance activities to 4–7 days a week, flexibility activities daily, and strength and balance activities 2–4 days a week	65+ years	To achieve health benefits, adults should accumulate at least **150 min of moderate- to vigorous-intensity aerobic physical activity per week**, in bouts of 10 min or more. It is also beneficial to add **muscle- and bone- strengthening activities** using major muscle groups, at least **2 days per week**. Those with poor mobility should perform physical activities to enhance balance and prevent falls	65+ years	Not available

Notable differences between guidelines are highlighted in bolded text

izations may have different rates of adoption. When the frequency of adoption is plotted on a graph over time the distribution of the rate of adoption typically forms an S-shaped curve [7]. This curve indicates that only a few organizations will adopt an innovation when first introduced but, over time, a critical mass is reached and more organizations will adopt the innovation at a steadier rate until only a few organizations have chosen to reject the innovation.

Little research has investigated the rate of adoption of evidence-based guidelines among service organizations, and few empirical studies have even acknowledged the complexities of spreading new innovations within service organizations [8]. In this paper, we describe a natural observational study that provided opportunity to gain some insight into these complexities. The release of new evidence-based Canadian Physical Activity [9] and Sedentary Behaviour [10] Guidelines provided the context for this study. Over a 9-month period, we tracked the rate of adoption of these new guidelines on the websites of Canadian organizations that promote physical activity to the general population. We chose to assess website content rather than print-based physical activity promotion materials because website-based material is relatively easy and affordable to change and to update efficiently, whereas print-based promotion materials may take longer to update. We hypothesized that adoption of the new guidelines on websites would increase over time among physical activity service organizations. Furthermore, we hypothesized that as the new guidelines were adopted, the presence of outdated content reflecting the old physical activity guidelines (e.g., Canada's physical activity guides) [11] would decrease.

This natural observational study also provided opportunity to investigate how various influences can affect the spread of an innovation within a service organization. According to Greenhalgh and colleagues [8], who have proposed an adaptation to diffusion of innovations theory specific to service organizations, aspects of the innovation, the network structure of the service organization, and the presence of opinion leaders and formal dissemination programs affect the adoption of innovations by service organizations [8]. In the current study, we were able to examine the impact of a formal dissemination activity–the delivery of webinars–on service organizations' uptake of the guidelines on their websites. Greenhalgh and colleagues describe such dissemination activities on a continuum from passive diffusion to active dissemination [8]. Passive diffusion occurs when the spread of an innovation is unplanned, informal, decentralized, and largely horizontal or mediated by peers, whereas active dissemination takes place when the spread of an innovation is planned, formal, often centralized, and occurs through vertical hierarchies [8]. While passive diffusion through interpersonal social networks is considered the dominant mechanism for diffusion, research has found that active dissemination through mass media and other impersonal channels may create awareness of an innovation [8]. Although not comprehensive, educational sessions such as a webinar are planned and formal and thus are more of an active form of dissemination than a passive form of diffusion. Findings from a study by Brownson and colleagues [12] examining the adoption of evidence-based guidelines for promoting physical activity among US health departments are consistent with this notion that an educational session may serve as a somewhat active dissemination strategy that enhances awareness. In their study, individuals who attended educational workshops about the guidelines had greater increases in knowledge about physical activity promotion than individuals who did not attend. To corroborate this finding, we examined the effectiveness of webinars as a dissemination strategy to encourage guideline adoption among service organizations. Given that formal and planned strategies to actively disseminate information generally raise awareness about an innovation [8], we hypothesized that organizations would be more likely to adopt the guidelines on their website if a representative from their organization attended a webinar than organizations that did not have a representative attend the webinar.

METHOD

Context

On January 16, 2011, the Canadian Society for Exercise Physiology (CSEP) in partnership with ParticipACTION released the new Canadian Physical Activity Guidelines [9] (see Table 1). In February 2011, these organizations also released evidence-based Sedentary Behaviour Guidelines for Children and Youth [10] (see Table 1). CSEP is the principal body for physical activity, health and fitness research, and personal training in Canada. ParticipACTION is a not-for-profit organization that serves as the national voice of physical activity and sport participation in Canada. Together, CSEP and ParticipACTION were well positioned to develop and disseminate the guidelines–CSEP had the content expertise for developing the guidelines and a national network of fitness professionals through which the guidelines could be disseminated. ParticipACTION is a recognized public health brand and has established communications infrastructure and networks to broadly disseminate the guidelines [13].

The physical activity guidelines reflected the state of the science and were meant to replace the old guidelines. The sedentary behavior guidelines were a new innovation not previously available in Canada. With the release of these guidelines, physical activity promotion service organizations should have changed their promotion materials to reflect the new state of the science information. Details about the new guidelines were made available to organizations through webinars, the CSEP, ParticipACTION, and Public Health Agency of

Canada websites, media launches, and emails to stakeholders. Notably, financial resources were not available for a comprehensive, systematic promotion of the guidelines among service organizations.

Sample

A list of service organizations that promote physical activity to Canadians was created from CSEP's directory of stakeholder organizations and Canadian public health units. Originally, CSEP's stakeholder directory included 161 organizations with websites. The directory included medical organizations, research institutions, and health service organizations. Because many of these organizations have expressed interest in keeping up-to-date information on developments in the physical activity sector but do not directly promote physical activity to the Canadian public, we systematically reduced the list to include only organizations that directly promote health or active living to the Canadian public. To reduce the list, two independent coders assessed the relevance of each organization's mandate. Organizations that did not specifically promote health or active living to the general public were excluded. The final list included 45 CSEP stakeholder organizations and 114 public health units across Canada.

Procedure

Websites were coded by six independent raters at four time points: prior to the release of the guidelines (baseline); 3 months post-release; 6 months post-release; and 9 months post-release. These timelines were selected based on recommendations that emerged from a meeting with key physical activity stakeholders. The stakeholders suggested that change would not be immediate (i.e., within days) given that internal review processes typically occur within service organizations [14].

Dissemination approach

CSEP offered two telephone-based webinars about the guidelines to service organizations. The first webinar provided information about the new physical activity guidelines [9] and the second webinar addressed the new sedentary behavior guidelines [10]. Both webinars were hour-long interactive telephone sessions designed to help service organizations understand the new guidelines and provide information about how to disseminate the guidelines. The agenda of the physical activity guideline webinar included a brief review of the background and process used, presented the guidelines, provided an explanation of why the new guidelines were needed, highlighted new aspects of the guidelines, outlined the dissemination plan for the guidelines, and identified future areas for physical activity guideline research. The agenda of the sedentary behavior guideline webinar included a discussion around the definition of sedentary behavior, an overview of the scientific evidence relating to sedentary behavior, an explanation of the process used to develop the guidelines, a presentation of the new sedentary guidelines, an overview of the dissemination plan for the guidelines, and a discussion of future areas for sedentary behavior guideline research.

Measures

Organization demographics

Demographic information describing the regions served by each organization was collected from organization websites when available. We specifically investigated the level (local, national, or provincial) that an organization served and the types of communities (rural, urban, or remote) served by an organization. In addition, a list of organizations that had a representative to attend the CSEP physical activity guideline and/or the sedentary behavior guideline webinar was obtained from CSEP records.

The coding manual

A coding manual was developed that provided coders with instruction for determining the presence of the guidelines and relevant physical activity information (e.g., links, news bulletins) on websites. There were three main sections to the coding manual and several subcategories in each section. The main sections included physical activity guidelines, sedentary guidelines, and additional content.

At baseline, a draft coding manual was piloted by six independent raters. Each of the raters coded five identical websites that were chosen at random. In addition to indicating the presence of guideline content using the online manual, screen shots of the website were taken of websites with guideline content. A multiple-rater kappa statistic SPSS macro was performed to determine the consistency among raters [15]. A kappa of .70 or greater was deemed acceptable [16]. The initial reliability of this coding scheme proved to be insufficient due to unclear definitions. For example, coders were unsure as to whether websites needed to specifically state the guidelines or simply provide a link to organizations that report the guidelines. This issue was addressed by creating two distinct categories; the first category represented the guidelines being explicitly stated on the website and the second category addressed the presence of links to organizations that report the guidelines. Once the coding manual was revised and category definitions were refined, acceptable reliability was achieved. At each time point, this reliability verification procedure was repeated. Once reliability was achieved at each time point, the responsibility of coding the remaining websites was divided among the six raters.

Physical activity guidelines–This category captured whether or not any type of physical activity

guideline was present on a website. In order for a website to be coded as having guidelines on their website, the guidelines had to appear on the website.

If a website included any physical activity guideline, the content was coded as old guideline content, new guideline content, or both old and new guideline content. Whether or not the guideline content was accurate and what types of guidelines were present (child, youth, adult, older adult, not specified) on the website were also coded. A link to the guidelines on the CSEP, ParticipACTION, or Public Health Agency of Canada website was not sufficient. This distinction was made to ensure that service organizations were not falsely given credit for including guidelines when the change in the link was made by CSEP, ParticipACTION, or Public Health Agency of Canada rerouting links rather than the service organizations making the change.

Sedentary guidelines–This category captured whether or not the sedentary behavior guidelines for children or youth were provided. In order for a website to be coded as having guidelines, the guidelines had to appear on the website.

Additional content–This category was reserved for additional content that may indicate an organization's attempt to adopt the new physical activity guidelines on their website. This category specifically captured whether or not (a) a link to CSEP, ParticipACTION, or the Public Health Agency of Canada was present on the website; (b) the old physical activity guide that was previously published by Public Health Agency of Canada and CSEP and contained the old physical activity guidelines was present [17]; (c) a link to the CSEP tip sheets was present; and (d) additional information about the guidelines was present (e.g., news bulletin or article).

Data treatment

We examined presence or absence of website content for each subcategory within the coding manual. We also determined the presence of *any type of guideline content* (i.e., at least one of the following appeared on the website: physical activity guidelines (old or new), sedentary behavior guidelines, and/or additional content) and presence of *content related to the new physical activity guidelines only* (i.e., at least one of the following appeared on the website: physical activity guidelines (new only) and/or additional content).

Analysis

Cochran's Q test statistic was used to test our hypotheses that the presence of new physical activity and sedentary behavior content (e.g., presence of guidelines and additional content) would increase over time and old information about the physical activity guidelines would decrease over time. If Cochran's Q statistic was found to be significant, pairwise comparisons between the coding time points were conducted. To test our secondary hypotheses that webinar attendance would be associated with the uptake of the guidelines, Pearson's chi-square test for independence or Fischer's exact test was used. Effect size was calculated using phi. If a significant association was found, standardized residuals were examined to determine the nature of the association [18].

RESULTS

Organizations

In total, 159 organization websites were coded. The websites of 45 organizations (28 %) represented stakeholders of CSEP while 114 websites (72 %) represented public health units across Canada. Among all websites coded, 34 % organizations were classified as either national or provincial organizations, while 66 % of the organizations served local communities. The majority of organization websites did not indicate whether they primarily serve remote, rural, and/or urban communities (47 %). Among organizations who stated the region served, 30 % served both urban and rural communities, 11 % served urban communities, and 12 % served rural communities. Only 6 % of the websites coded represented organizations that served a remote location.

With regard to webinar attendance, 36 % of the organizations represented in our sample attended the physical activity guideline webinar, 8 % of the organizations represented attended the sedentary guideline webinar, and 7 % of the organizations represented attended both webinars.

Coding reliability

The inter-rater reliability among the two raters responsible for reviewing the CSEP stakeholder list and identifying organizations with a physical activity mandate was kappa=.79 ($p<.001$). The inter-rater reliability for the six raters responsible for coding website content was found to be kappa>.70 ($p<.001$) at all four time points. Discrepancies between raters were discussed, and agreement was reached on all points.

Website content

Over the course of the 9-month tracking period, website postings of any type of content related to the physical activity or sedentary guidelines peaked at 51 %. The presence of any guideline content increased over the coding period (Cochran's Q test, $p=.01$) with a significant increase occurring between baseline and 6 months ($p<.05$). Details of the specific content of these postings are considered below. Uptake rates are reported in Table 2.

Physical activity guidelines–The new physical activity guidelines were observed on up to 17 % of websites during the coding period. Significant increases in new physical activity guidelines were observed over the coding period (Cochran's Q test, $p<.01$). The appearance of the new physical activity

Table 2 | The presence of guideline content across time points

	Baseline (%)	3 months (%)	6 months (%)	9 months (%)
Overall content				
Any guideline content	41.5 [a]	48.7	51.0 [a]	50.0
Guidelines				
Old guidelines	23.9 [a]	11.3 [a]	12.6	13.2
New guidelines	1.3 [a,b,c]	10.7 [a]	13.8 [b]	17.0 [c]
Sedentary guidelines	.6 [a,b]	5.0	8.8 [a]	7.5 [b]
Additional content				
Link to CSEP, PHAC, or ParticipACTION	35.8 [a,b]	44.9 [a]	45.2 [b]	43.4
CSEP Tip Sheet Content	0 [a,b]	8.8 [a]	7.6 [b]	5.7
Other content	.6 [a]	7.0	6.4 [a]	5.1
Old physical activity guide	4.4	1.9	4.4	6.3

Values in the same row that share a common superscript letter are significantly different ($p<.05$)

guidelines on websites significantly increased between baseline and 3, 6, and 9 months ($p<.01$). During the same period, the old physical activity guidelines were observed on up to 24 % of websites. This rate significantly decreased over the coding period (Cochran's Q test, $p<.001$) from baseline to 3 months, $p<.01$, and remained low at 6 and 9 months. The new and old physical activity guidelines were consistently reported correctly on websites across all four time points (Cochran's Q test, $p>.05$).

Sedentary behavior guidelines–During the coding period, the appearance of the sedentary guidelines on websites peaked at 9 % with postings increasing over the coding period (Cochran's Q test, $p<.001$). Paired comparisons revealed increases between baseline and 6 and 9 months ($p<.01$).

Additional content–A link to the CSEP, PHAC, or ParticipACTION website was observed on up to 46 % of websites. The CSEP tip sheet appeared on up to 9 % of websites. The presence of these resources increased over the coding period (Cochran's Q test, $p=.02$). Paired comparisons revealed an increase in postings of both resources between baseline and 3 and 6 months only ($p<.04$). Other additional content about the guidelines, such as news bulletins and blogs, was observed on up to 7 % of websites (Cochran's Q test, $p=.03$). Paired comparisons revealed that increases in this content occurred between baseline and 6 months ($p=.05$). The old physical activity guide was observed on up to 7 % of websites. This rate did not change significantly over the coding period (Cochran's Q test, $p>.05$).

Webinar effectiveness

The Chi-square tests of independence examining the relationships between webinar attendance and posting of any content related to the new physical activity or sedentary behavior guidelines were conducted on the data representing the point of peak adoption (physical activity=9 months, sedentary behavior=6 months) (Table 3). The chi-square tests of independence were significant ($\chi^2_{\text{physical activity}}(1, N=157)=13.08$, $p<.001$, $\varphi=.29$; $\chi^2_{\text{sedentary}}(1, N=159)=19.39$, $p<.001$, $\varphi=.35$). Standardized residuals reveal a trend indicating that organizations were more likely to post the guidelines if they had a representative attend a webinar.

DISCUSSION

In 2011, new Physical Activity and Sedentary Behaviour Guidelines were released in Canada. During the 9-month period following their release, 51 % of organizations with an interest in promoting physical activity posted the guidelines or related information on their websites. The pattern of uptake and types of resources selected for posting provide insight into the processes and practices underlying guideline dissemination in a novel context–service organizations with an interest in physical activity promotion.

Our hypothesis that the rate of online adoption of the new physical activity and sedentary behavior guidelines would increase over time was confirmed. The presence of the physical activity and sedentary behavior guidelines and supporting resources on

Table 3 | Webinar attendance and peak guideline adoption

	Posted content (*n*)	Did not post content (*n*)
Active dissemination: any physical activity content		
Attended physical activity guideline webinar	64.3 % (36)*	35.7 % (20)*
Did not attend physical activity guideline webinar	35.0 % (35)	65.0 % (65)
Active dissemination: sedentary behavior guidelines		
Attended sedentary behavior guideline webinar	38.5 % (5)*	61.5 % (8)
Did not attend sedentary behavior guideline webinar	6.2 % (9)	93.8 % (137)

Peak adoption point: physical activity=9 months; sedentary behavior=6 months

*$p<.05$ (indicates a significant association)

websites increased from 42 % to a peak of 51 % at 6 months (5–6 months after the release of both sets of guidelines). This increase is encouraging, suggesting that the release of new guidelines led many organizations to bring the new recommendations to the forefront in their provision of online resources. The most common strategy for adopting the guidelines was the inclusion of links to websites that were housing the guidelines (e.g., the CSEP website). It seems that when disseminating a new innovation to service organization, having a central website with up-to-date information about the innovation is critical. Furthermore, our data indicate that consistent with our hypothesis, engaging organizations in webinars (e.g., a somewhat active dissemination approach) may be one method for increasing the likelihood of adoption. The added benefit of more comprehensive, ongoing active dissemination strategies should be investigated.

A large portion of organizations did not engage in the webinars and did not feature the guidelines on their websites. In accordance with diffusion of innovations theory, lack of uptake may be the result of a failure to reach a critical mass or may be attributable to characteristics of the innovation (i.e., the guidelines). For the sedentary behavior guidelines specifically, low rate of adoption may reflect differences in the process of replacing an old innovation versus adopting a new innovation. We consider these possibilities each in turn.

The rate of adoption increased initially but then plateaued–a pattern of adoption characteristic of cases when adoption of an innovation does not reach a critical mass [7]. According to Rogers, critical mass occurs when enough organizations in a system adopt an innovation and the innovation's rate of adoption becomes self-sustaining [7]. Had the guidelines reached a critical mass, the rate of adoption may have continued to increase with little additional investment from organizations leading the dissemination efforts (i.e., CSEP and ParticipACTION). More comprehensive and sustained dissemination efforts may be needed to ensure that critical mass is reached [8]. Alternatively, a longer data tracking period might have captured the point at which a critical mass was reached. Indeed practitioners have noted that change within the context of a service organization takes time [14].

Characteristics of the innovation and the dissemination strategy may also explain the lack of uptake of the guidelines on organizations' websites. Rogers has identified five characteristics of an innovation that influence rate of diffusion including relative advantage, compatibility, usability, observability, and trialability. Perhaps the guidelines did not have these necessary characteristics to foster adoption by some organizations. Take for example the CSEP tip sheets. Despite being created to communicate the guidelines in a user-friendly format, they were an underused resource with only 9 % of organizations posting them on their websites. It may be that the one-page format of the tip sheets was too brief and did not provide a *relative advantage* compared to older, more comprehensive resources. The lack of uptake of the tip sheets might also have been a matter of *usability*. Organizations may not have realized that they could use the tip sheets on their websites without having to request permission from CSEP. Making clear and repeatedly highlighting the expectations related to licensing and copyright for resources supporting the dissemination of an innovation may enhance the uptake of such resources. Moreover, the dissemination strategy of making guidelines and a one-page tip sheet available for adoption without financial support for adoption or the creation of additional materials might not have been *compatible* with the needs and values of the service organizations. A recent assessment of the capacity of Canadian service organizations that are mandated to promote physical activity found that a lack of funding is a major barrier to physical activity promotion [5]. A dissemination approach that provides organizations subsidy for staff to modify their websites and to tailor the guideline materials to their organizations' programs and services would be a major advancement [14].

The especially low uptake of the sedentary behavior guidelines also provides insight into practical considerations for innovation dissemination. At the time of this study, sedentary behavior guidelines were released for children and youth only. Many organizations in our sample had the broad mandate of promoting physical activity to the general population, and as such, they might not have considered certain age-specific guidelines entirely relevant (i.e., the guidelines were not compatible). Also, the notion of reducing sedentary activity is a relatively new behavioral goal for service organizations [10]. While not widely explored, Rogers has postulated that the decision to adopt a novel innovation (e.g., sedentary guidelines) is likely different than the decision to reject an old innovation and replace it with a new innovation (e.g., physical activity guidelines) [7]. Therefore, it is possible that further education about this novel behavioral target is needed.

Limitations

Despite these interesting findings, we must acknowledge the limitations of the present work. We only evaluated the presence of guidelines on websites; therefore, we cannot make claims about the uptake of the guidelines within other facets of the service organizations. Future research should examine the adoption of guidelines within the wider context of service organizations (e.g., print brochures and daily practices). Furthermore, websites were only evaluated for 9 months. It may not be reasonable to expect adoption to occur in such a limited time frame. As mentioned previously, very few organizations had a representative to attend a webinar; therefore, our tests of the effects of webinars may be limited by sample size. We were unable to survey the service organizations to gain an understanding of barriers or facilitators of adoption such as innovation compatibility. The reasons for failing to adopt the guidelines also remain

unclear. Recognizing that key informant interviews would provide substantial insight into reasons for adopting or failing to adopt the guidelines, we did attempt to contact a subsample of organizations to inquire about their decision to include or not include the guidelines on their websites. This attempt was entirely unsuccessful–many of the organizations reached could not identify the staff person who would oversee the integration of the guidelines on their websites. Alternative strategies for obtaining valuable qualitative data that describe diffusion processes within an organization must be employed.

Conclusion

The release of new physical activity and sedentary behavior guidelines led to increased guideline adoption on service organizations' websites. However, adoption was not universal. As such, it seems that passive diffusion strategies that are effective in the context of product-based dissemination may not be optimal for the diffusion of innovations within service organization. Comprehensive, active dissemination strategies tailored to address organizational barriers may be optimal in this context.

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1. Warburton DE, Charlesworth S, Ivey A, Nettlefold L, Bredin SS. A systematic review of the evidence for Canada's Physical Activity Guidelines for Adults. *Int J Behav Nutr Phys Act*. 2010;7:39.
2. Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. *Appl Physiol Nutr Metab*. 2010;35(6):725-740.
3. Bellew B, Schoeppe S, Bull FC, Bauman A. The rise and fall of Australian physical activity policy 1996–2006: a national review framed in an international context. *Aust New Zealand Health Policy*. 2008;5:18.
4. Tremblay M, Haskell WL. From science to physical activity guidelines. In: Bouchard C, Blair SN, Haskell WL, eds. *Physical Activity and Health*. 2nd ed. Champaign, IL: Human Kinetics; 2012.
5. Faulkner G, McCloy C, Plotnikoff RC, et al. ParticipACTION: baseline assessment of the capacity available to the 'New ParticipACTION': a qualitative study of Canadian organizations. *Int J Behav Nutr Phys Act*. 2009;6:87.
6. Plotnikoff RC, Todosijczuk I, Faulkner G, et al. ParticipACTION: baseline assessment of the 'new ParticipACTION': a quantitative survey of Canadian organizational awareness and capacity. *Int J Behav Nutr Phys Act*. 2009;6:86.
7. Rogers EM. *Diffusion of innovations*. 5th ed. New York, NY: Free Press; 2003.
8. Greenhalgh T, Robert G, MacFarlane F, Bate P, Kyriakidou O. Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Q*. 2004;82(2):581-629.
9. Tremblay MS, Warburton DE, Janssen I, et al. New Canadian physical activity guidelines. *Appl Physiol Nutr Metab*. 2011;36 (1):36-46.
10. Tremblay MS, LeBlanc A, Janssen I, et al. Canadian sedentary behavior guidelines for children and youth. *Appl Physiol Nutr Metab*. 2011;36(1):65-71.
11. Canadian Society for Exercise Physiology. Canada's physical activity guide—synthesis of substantive content for the guide based on the scientific review process. Document summary in preparation of Canada's Physical Activity Guide for Healthy Active Living. 1996; http://www.csep.ca.
12. Brownson RC, Ballew P, Brown KL, Elliott MB, Haire-Joshu D, Heath GW, Kreuter MW. The effect of disseminating evidence-based interventions that promote physical activity to health departments. [Multicenter Study Research Support, U.S. Gov't, P.H.S.]. *Am J Public Health*. 2007;97(10):1900–1907.
13. Latimer AE, Murumets K, Faulkner G. ParticipACTION: the national voice of physical activity and sport participation in Canada. In: Marcus B, ed. *The American National Physical Activity Plan*. Champaign, IL: Human Kinetics; 2013, In Press.
14. Latimer-Cheung AE, Tomasone JR, Rhodes RE, et al. Developing evidence-based messages for translating physical activity guidelines into practice. *Ann Behav Med*. 2012;43(1):s93.
15. *Multiple-Rater Kappa Statistic Macro (MKAPPASC.SPS)* [computer program] 1997; https://www.msu.edu/course/psy/818/deshon/Projects/Misc%20files/mkappasc.txt.
16. Fleiss J, Levin B, Cho PM. *Statistical Methods for Rates and Proportions*. Hoboken, NJ: Wiley; 2003.
17. Physiology CSfE. Canada's Physical Activity Guide—synthesis of substantive content for the guide based on the scientific review process. Document summary in preparation of Canada's Physical Activity Guide for Healthy Active Living. 1996; http://www.csep.ca.
18. Fields A. *Discovering Statistics Using SPSS*. London: Sage; 2009.