

ORIGINAL ARTICLE

Development of an evidence-informed leisure time physical activity resource for adults with spinal cord injury: the SCI Get Fit Toolkit

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Objectives: To systematically develop an evidence-informed leisure time physical activity (LTPA) resource for adults with spinal cord injury (SCI).

Setting: Canada.

Methods: The Appraisal of Guidelines, Research and Evaluation (AGREE) II protocol was used to develop a toolkit to teach and encourage adults with SCI how to make smart and informed choices about being physically active. A multidisciplinary expert panel appraised the evidence and generated specific recommendations for the content of the toolkit. Pilot testing was conducted to refine the toolkit's presentation.

Results: Recommendations emanating from the consultation process were that the toolkit be a brief, evidence-based resource that contains images of adults with tetraplegia and paraplegia, and links to more detailed online information. The content of the toolkit should include the physical activity guidelines (PAGs) for adults with SCI, activities tailored to manual and power chair users, the benefits of LTPA, and strategies to overcome common LTPA barriers for adults with SCI. The inclusion of action plans and safety tips was also recommended.

Conclusion: These recommendations have resulted in the development of an evidence-informed LTPA resource to assist adults with SCI in meeting the PAGs. This toolkit will have important implications for consumers, health care professionals and policy makers for encouraging LTPA in the SCI community.

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Keywords: leisure time physical activity; exercise; health promotion guidelines; spinal cord injury; evidence-based; knowledge translation

INTRODUCTION

Leisure time physical activity (LTPA) improves fitness and well-being in persons with spinal cord injury (SCI),^{1,2} yet 50% of this population participate in no LTPA whatsoever.³ Lack of knowledge and resources are two barriers that significantly influence LTPA participation.² Addressing such barriers would be an important and necessary step towards improving LTPA levels among the SCI population.

In 2011, the first-ever physical activity guidelines (PAGs) for adults with SCI were published internationally.⁴ These guidelines were developed, in consultation with a multidisciplinary expert panel, using a systematic review and quality appraisal (the Appraisal of Guidelines, Research and Evaluation (AGREE) II)^{5–7} of research examining the effects of exercise on the physical fitness of people with SCI.¹ The PAGs state that healthy adults with SCI should engage in ≥ 20 min of moderate to heavy aerobic activity twice/week, and strengthening exercises two times/week.⁴

Supplementing the PAGs with evidence-informed resources that teach adults with SCI how to achieve these guidelines is essential for

effective behavior change.⁸ The current paper describes the systematic process used to develop an evidence-informed, SCI-specific LTPA resource ('SCI Get Fit Toolkit'). The process involved a multidisciplinary expert panel and used the AGREE II protocol^{5–7} to formulate the toolkit content and recommendations for dissemination. Although the AGREE II is most often used to develop evidence-based clinical practice guidelines, recent work has shown that the protocol can also be effectively applied to health promotion practices.⁹ Our work extends this research by demonstrating the translation of empirical evidence into a practical LTPA resource for the SCI community.

METHODS AND RESULTS

Overview

The 23-item AGREE II instrument^{5–7} was used as a framework to develop the toolkit. Similar to previous research,⁹ the wording of the items was modified to fit a health promotion practice rather than a clinical practice guideline (see Table 1). Figure 1 provides a summary of the events leading to the

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Table 1 Modifications to AGREE II items and application to the toolkit

<i>AGREE II item</i>	<i>Modified AGREE II item</i>	<i>Application to the toolkit</i>
<i>Domain 1- Scope and purpose: objectives, practical questions and target population</i>		
1. The overall objective of the guideline is specifically described.	The overall objective of the toolkit is specifically described.	To develop an evidence-based resource that will teach adults with SCI how to make smart and informed choices about being physically active.
2. The health question covered by the guideline is specifically described.	The practical questions covered by the toolkit are specifically described.	(1) How can the PAGs be communicated?; (2) What type of resource will motivate adults with SCI to engage in LTPA?
3. The population to whom the guideline is meant to apply is specifically described.	The population to whom the toolkit is targeted towards is specifically described.	Healthy adults with traumatic/non-traumatic chronic SCI (ages 18–64), including tetraplegia/paraplegia, manual/power chair users and adults not meeting the SCI PAGs.
<i>Domain 2- Stakeholder involvement: consideration of the views of the target group(s) and their representation within the recommendations development group</i>		
4. The guideline development group includes individuals from all relevant professional groups.	The expert panel includes individuals from all relevant professional groups.	Experts in SCI, LTPA, medicine, sport, education and knowledge translation; representatives from disability organizations, service providers and academia.
5. The views and preferences of the target population have been sought.	Original AGREE item retained.	Panel included end users of the toolkit. Recommendations were based on formative research involving 78 consumers with SCI. ¹⁰
6. The target users of the guideline are clearly defined.	The target users of the toolkit are clearly defined.	Adults with SCI, community partners, practitioners, rehabilitation/fitness centers, Ministry of Health, Canadian Parks and Recreation Assoc., Canadian Society of Exercise Physiology.
<i>Domain 3- Rigour of development: methods and criteria used to inform the recommendations, the review process, and plans for updating</i>		
7. Systematic methods were used to search for evidence.	Original AGREE item retained.	Research evidence purposely selected by the project leads. Examples include the SCI PAG paper, ⁴ and the SCIRE physical activity and SCI chapter. ²
8. The criteria for selecting the evidence are clearly described.	Original AGREE item retained.	(1) SCI-specific; and (2) focus on the benefits of/barriers to LTPA, LTPA determinants and preferences, and interventions for promoting LTPA.
9. The strengths and limitations of the body of evidence are clearly described.	Original AGREE item retained.	A detailed description of the strengths and limitations of the evidence is outlined in the review of evidence-base (Phase 2) section.
10. The methods for formulating the recommendations are clearly described.	Original AGREE item retained.	A multistep process was used: (1) review of evidence by panel members before the meeting; (2) a summary of key points from evidence-base; (3) structured work group discussions; and (4) review and revision of recommendations.
11. The health benefits, side effects and risks have been considered in formulating the recommendations.	The practical implications have been considered in developing the toolkit.	Increased awareness and knowledge of the PAGs and behavioral strategies for engaging in LTPA; increased discussion of LTPA and exercise prescription in routine practice; and an advocacy tool for improving LTPA opportunities for consumers with SCI.
12. There is an explicit link between the recommendations and the supporting evidence.	Original AGREE item retained.	The evidence-base for each recommendation is shown in Table 3.
13. The guideline has been externally reviewed by experts before its publication.	The recommendations have been externally reviewed by experts before its publication.	Toolkit content and format recommendations were reviewed and revised by panel experts and 15 consumers with SCI.
14. A procedure for updating the guideline is provided.	A procedure for updating the toolkit is provided.	The online toolkit will be updated according to the resources available within SCI Action Canada.
<i>Domain 4—Clarity of presentation: transparency of the recommendations and dissemination options</i>		
15. The recommendations are specific and unambiguous.	Original AGREE item retained.	Recommendations were considered clear in pilot studies with SCI consumers and the panel (refer to Tables 4 and 5).
16. The different options for management of the condition or health issue are clearly presented.	The different options for developing and disseminating the toolkit are clearly presented.	Panel recommended developing a 4-page paper copy that would be supplemented with a more detailed online version hosted on the SCI Action Canada website. Suggested dissemination options include: mailing paper copies to community partners; posting links on social media; mass media and testimonials from various end users
17. Key recommendations are easily identifiable.	Original AGREE item retained.	Recommendations were considered easily identifiable in pilot studies with SCI consumers and the panel (refer to Tables 4 and 5).
<i>Domain 5—Applicability: dissemination-related barriers and facilitators and the expected resource implications</i>		
18. The guideline describes facilitators and barriers to its application.	Facilitators and barriers to disseminating the toolkit were discussed.	Facilitators and barriers are outlined in the Discussion.
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	The recommendations provide advice and/or tools on how the toolkit can be put into practice.	Ensuring practitioners can readily distinguish the credibility of the information; and having respected medical champions advocate for the toolkit to be used in routine practice.
20. The potential resource implications of applying the recommendations have been considered.	The potential resource implications of disseminating the toolkit have been considered.	Printing; website management; service providers available to send updates to members; and greater demand for resources and staff.
21. The guideline presents monitoring and/or auditing criteria.	Strategies for monitoring and/or auditing the uptake of the toolkit have been considered.	Monitoring the distribution of paper copies; and using Google analytics to assess online use of the toolkit. There is no current funding for monitoring the uptake of the toolkit.
<i>Domain 6—Editorial independence: independency of the recommendations from the views of the funding body and competing interests of the expert panel</i>		
22. The views of the funding body have not influenced the content of the guideline.	The views of the funding body have not influenced the content of the toolkit.	Representatives from funding agencies did not participate in the development process of the toolkit.
23. Competing interests of guideline development group members have been recorded and addressed.	Competing interests of the recommendation development group have been recorded and addressed.	None of the panel members reported conflicts of interest.

Abbreviations: AGREE, Appraisal of Guidelines, Research and Evaluation; PAGs, physical activity guidelines; SCI, spinal cord injury; LTPA, leisure time physical activity.

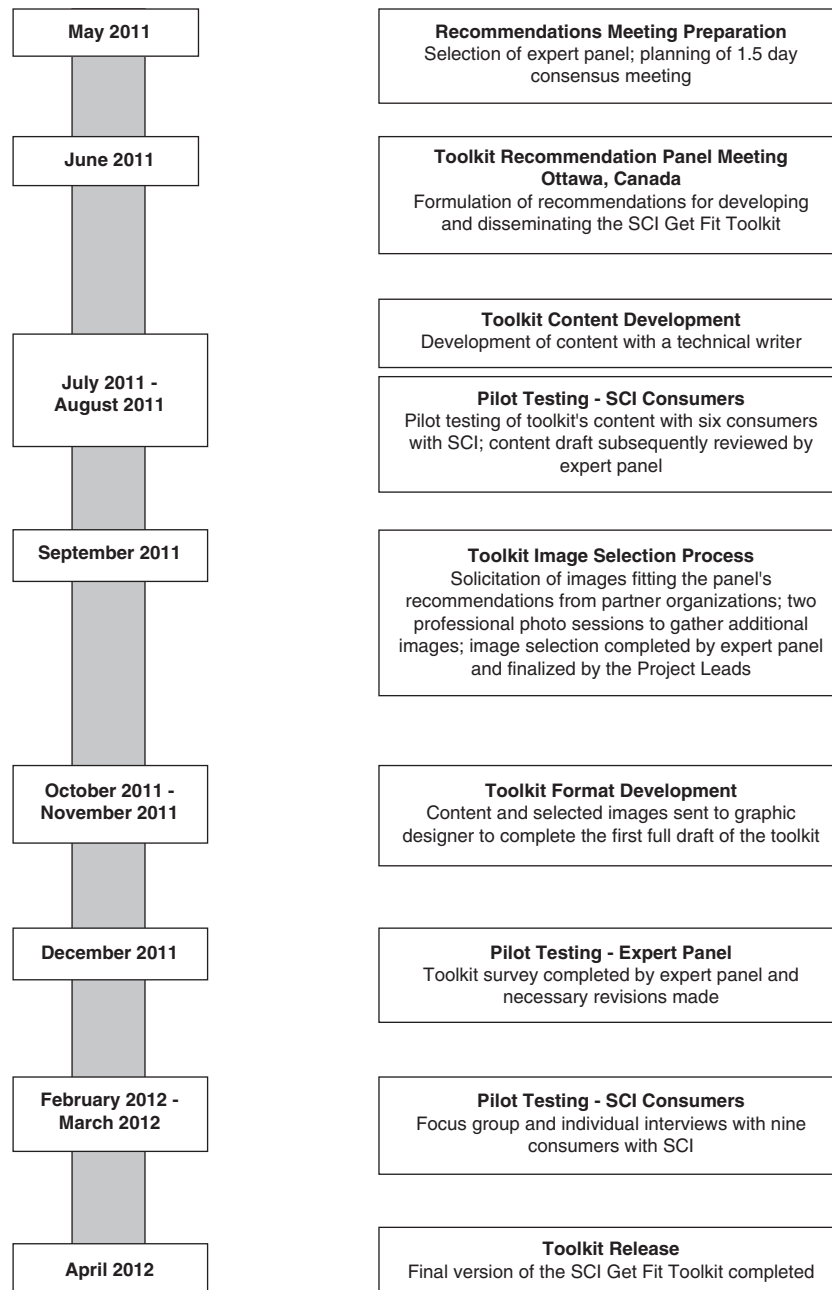


Figure 1 Timeline of the development of the SCI Get Fit Toolkit.

development of the toolkit. All applicable institutional regulations concerning the ethical use of human volunteers were followed during the course of this research.

Scope and purpose

The objective, practical questions, target population and end users were determined by the project leads (KAN, KMG) *a priori* based on previous systematic reviews^{1,2} and pilot work.¹⁰ An expert panel reviewed and agreed with these established parameters.

- Objective: to develop an evidence-informed resource that teaches and encourages adults with SCI how to make smart and informed choices about being physically active.
- Practical questions: how can the PAGs be communicated to adults with SCI? What type of resource will motivate adults with SCI to engage in LTPA?

- Target population: healthy men and women with traumatic or non-traumatic chronic SCI (ages 18–64),⁴ manual and power chair users, and adults not meeting the PAGs.
- End users: adults with SCI, community partners, practitioners, rehabilitation centers, Ministry of Health (Federal and Provincial), Canadian Parks and Recreation Association, Canadian Society of Exercise Physiology, Young Men's Christian Association (YMCA) and other fitness centers.

Stakeholder involvement

Stakeholders including consumers with SCI, researchers, health care practitioners and community service providers were involved in: (a) the formative research conducted before developing the toolkit, (b) the development of the formal recommendations for the toolkit content and format, and (c) a review and feedback process. Specific details of their involvement are highlighted below.

Table 2 Expert panel for the toolkit recommendations development group

Name	Expertise and institution	Role(s) and work group
Dr Kelly Arbour-Nicitopoulos, PhD	SCI, physical activity behavior change, knowledge translation, <i>researcher</i> : McMaster University, SCI Action Canada	Project colead, content expert, pilot testing, writing team; strategies to overcome barriers; layout
Dr Kathleen Martin Ginis, PhD	SCI, physical activity behavior change, knowledge translation, <i>researcher</i> : McMaster University; Director: SCI Action Canada	Project colead, content expert, writing team; strategies to overcome barriers; images
Chris Bourne, MA	SCI consumer, physical activity and disability <i>community development manager</i> : Active Living Alliance	Content expert; strategies to overcome barriers; images
Duncan Campbell, BA	SCI consumer, recreation therapy, wheelchair sports, <i>recreation therapist</i> : G F Strong Rehabilitation Center; Canadian Wheelchair Sports Association	Content expert; suggested activities, benefits and risks; layout
Shauna Cappe, BA	SCI consumer, health guidelines, <i>consumer</i> : Ottawa University, Canadian Society of Exercise Physiology	Content expert; suggested activities, benefits and risks; images
Spero Ginis, BPE, BEEd	Knowledge translation, education; <i>knowledge translation specialist</i> : SCI Action Canada	Content expert; strategies to overcome barriers; layout
Dr Audrey Hicks, PhD	SCI, neuromuscular physiology, exercise rehabilitation, <i>researcher</i> : McMaster University, SCI Action Canada; Director: MacWheelers SCI Rehabilitation Program; President: Canadian Society of Exercise Physiology	Content expert; suggested activities, benefits and risks
Dr Amy Latimer-Cheung, PhD	SCI, physical activity behavior change and messaging, <i>researcher</i> : Queen's University, SCI Action Canada; Executive Director: Reeved Up Assisted Exercise Program	Content expert, writing team; suggested activities, benefits and risks; layout
Pierre Pomerleau, MSc	SCI physical education specialist; <i>recreation therapist</i> : Québec IRDPQ	Content expert; suggested activities, benefits and risks; images
Dr Karen Smith, MD	SCI, psychiatry; <i>clinician and researcher</i> : Queen's University, St. Mary's of the Lake Hospital	Content expert; suggested activities, benefits and risks

Abbreviation: SCI, spinal cord injury.

Toolkit development process

This section provides a detailed description of the 4-phased process used to develop the toolkit. Table 1 relates each step in this process to the modified AGREE II items.

Phase 1: formative research. The views and preferences of the target population were previously sought in a needs assessment among 78 adults with SCI.¹⁰ Overall, participants preferred the content of the resource to provide clear activity definitions, home-based and seasonal activity examples, the benefits of physical activity and information tailored to injury groups. In terms of format preferences, participants preferred a booklet and/or an interactive website, text and picture combination, photographs, bright colors, simple messages, a pull-out calendar, quick facts and several pages of information.

Phase 2: review of evidence-base. The evidence-base providing the foundation for the toolkit included formative research,¹⁰ publication of the development of the SCI PAGs,⁴ the SCI PAGs, a validated, SCI-specific intensity chart,¹¹ a summary of the Spinal Cord Injury Rehabilitation Evidence systematic review on physical activity and SCI,² and abstracts of the two largest randomized controlled trials in the area of SCI and LTPA behavior change.^{12,13}

A purposive, rather than systematic, search strategy was used to gather the evidence-base to inform the recommendations due to the limited experimental research on exercise and health/fitness, and LTPA determinants and interventions in the SCI population.^{1,2} The criteria for selecting the evidence-base was that the research: (1) be specific to SCI, and (2) focus on the benefits of and barriers to LTPA, LTPA determinants and preferences, and interventions for promoting LTPA. The Spinal Cord Injury Rehabilitation Evidence review² provides the most rigorous evidence on the aforementioned topics; therefore, the recommendations were specifically directed towards the evidence-base emanating from this review.

The strengths of the research evidence include: the sufficient experimental research to support the fitness benefits of engaging in the recommended PAGs

in persons with chronic SCI,¹ the robustness of the relationship between LTPA-depressive symptomatology and LTPA-quality of life,¹⁴ the consistent occurrence of intrapersonal, systemic and expertise-related barriers to LTPA,¹⁵ the population-based research investigating determinants of LTPA participation³ and activity preferences,¹⁶ and the experimental evidence to support the use of theory-based behavior change strategies for increasing LTPA.^{12,13} The limitations include: insufficient evidence on the fitness benefits of exercise for acute SCI, sample heterogeneity, inadequate control groups, insufficient evidence on the health benefits of the SCI PAGs and participant selection bias.^{1,2,4} The recommendations were not externally reviewed by experts outside of the panel. However, individual interviews and focus groups were conducted with consumers with SCI to review the recommendations and content of the toolkit before the release of its final version. Refer to Phase 4 for a description of this consumer review process.

Phase 3: development of evidence-informed content and format recommendations. A multidisciplinary panel of 10 leading researchers and community service providers in the areas of SCI, LTPA, medicine (physiatry), sport, education and knowledge translation appraised the evidence and generated recommendations for the toolkit. Table 2 lists panel members, along with their expertise, affiliations and roles.

A multistep process was followed to formulate the recommendations. Before the meeting, the panel was provided the evidence-base to review. At the beginning of the meeting, a summary of the project's objectives and overview of the evidence was presented to the panel. On the basis of areas of expertise, panel members then participated in two of the four, 90-minute work group sessions (refer to Table 2), where they developed specific content and format recommendations using the evidence reviewed before the meeting (see Table 3). A debriefing meeting was then held at the end of the first day between the project leads and one expert panel member (AEL) to summarize these recommendations. On the second day, a facilitated discussion was held to review and revise the recommendations.

Table 3 Summary of the link between the SCI Get Fit Toolkit recommendations and supporting evidence

Topic	Recommendation(s)	Supporting evidence			
Activity preferences	Activity examples should: be tailored according to the mode of mobility (that is, power/manual chair) provide both aerobic and strengthening activity options include both indoor and outdoor examples provide examples of sport and leisure activities have a 'how to' link for further instruction online direct individuals to community resources	1, 2, 3, 4, 10 and 16			
Benefits	Benefits should convey to individuals the: cardiovascular fitness and strength benefits of physical activity participation potential physical health benefits of engaging in regular physical activity potential psychological and social health benefits of engaging in regular physical activity	1, 2, 4, 10			
Risks/safety tips	Safety tips should emphasize: gradual progression regular monitoring of skin hydration monitoring of s/s of autonomic dysreflexia, orthostatic hypotension and body temperature	2, 4, 10			
Barriers and coping strategies	<table border="0"> <tr> <td><u>Evidence-based barriers:</u> Lack of time Access/availability of resources Lack of social support Lack of knowledge Lack of physical ability Psychological (fear, self-efficacy) Stereotypes/stigma from others</td> <td><u>Coping strategy example:</u> Action planning (evidence-based) Equipment rental at local clubs Utilize existing physical activity services Learning more about the SCI PAGs Focusing on the energizing benefits of physical activity to get one moving Discuss options with a health care professional and/or an active peer Sharing one's expertise with others</td> </tr> </table>	<u>Evidence-based barriers:</u> Lack of time Access/availability of resources Lack of social support Lack of knowledge Lack of physical ability Psychological (fear, self-efficacy) Stereotypes/stigma from others	<u>Coping strategy example:</u> Action planning (evidence-based) Equipment rental at local clubs Utilize existing physical activity services Learning more about the SCI PAGs Focusing on the energizing benefits of physical activity to get one moving Discuss options with a health care professional and/or an active peer Sharing one's expertise with others	2, 10, 12, 13, 14, 15	
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Images	<table border="0"> <tr> <td><u>Images should include:</u> Sports activities done at the gym, home, work and during play (independence, assistance, family, friends) indoor/outdoor activities different seasons integrated/segregated activities males/females different ethnicities tetraplegia/paraplegia power/manual chair users standing/swimming exercises</td> <td><u>Messages should target:</u> ease of getting started enjoyment Convenience family variety (activity, intensity) gradual progression different fitness goals (competitive, recreation)</td> <td><u>Things to avoid/watch for:</u> poor positioning safety equipment chair that fits properly children using a wheelchair <u>Priority areas:</u> images of 'everyday' people Wii activities family images tennis (integrated)</td> </tr> </table>	<u>Images should include:</u> Sports activities done at the gym, home, work and during play (independence, assistance, family, friends) indoor/outdoor activities different seasons integrated/segregated activities males/females different ethnicities tetraplegia/paraplegia power/manual chair users standing/swimming exercises	<u>Messages should target:</u> ease of getting started enjoyment Convenience family variety (activity, intensity) gradual progression different fitness goals (competitive, recreation)	<u>Things to avoid/watch for:</u> poor positioning safety equipment chair that fits properly children using a wheelchair <u>Priority areas:</u> images of 'everyday' people Wii activities family images tennis (integrated)	10
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Layout	Layout should include/be: simple messages; bright colors; quick facts ('Did You Know' sections); calendar; text/image combination interspersed with resources (for example, website links, SCI-related services) four pages, which should include the following content: Page one: short version of the SCI PAGs, clear description of intensity and duration Page two: activity examples that are subdivided into aerobic and strengthening examples and tailored to power and manual chair users; include links to videos of people performing activities; no endorsing of equipment brands Page three: action plan examples (getting started, already active and increasing intensity/frequency), research evidence of action plans and sample strengthening routines Page four: coping strategy examples for evidence-based barriers, link to additional strategies on the website; safety tips on gradual progression, how to monitor skin, autonomic dysreflexia and orthostatic hypotension	10			

Abbreviations: PAGs, physical activity guidelines; SCI, spinal cord injury; s/s, signs and symptoms.

The expert panel agreed that the overarching message should be, 'physical activity is easy and fun to do!' and in French – 'C'est facile, allez-z!'. Table 3 summarizes the link between each of the six overarching recommendations and the supporting evidence. Although the need among consumers for a longer, paper copy version of the toolkit was recognized, the panel as a whole felt it would be more feasible to develop a toolkit similar in length to the

physical activity guides that have been previously developed for the Canadian adult able-bodied population.¹⁷ To accommodate the interests of the SCI community, it was agreed that more detailed 'how to' information would be made available on a toolkit section of the SCI Action Canada website—the organization responsible for hosting the online version of the toolkit.

Table 4 Toolkit ratings obtained from expert panel ($n=7$)

Item	Mean (s.d.)	Range	Area(s) of concern	Response to feedback
<i>Overall objectives</i>				
1. Toolkit appropriate for all healthy adults with SCI not meeting the PAGs?	5.71 (0.49)	5–6	Appropriateness for high tetraplegia group is in question.	Tetraplegia image has been included. More images will be included online.
2. Does the toolkit:				
(a) Teach adults with SCI how to make smart and informed choices about being physically active?	6.29 (1.11)	4–7		
(b) Encourage adults with SCI how to make smart and informed choices about being physically active?	6.71 (0.76)	6–7		
(c) Reflect the overarching message that 'physical activity is easy and fun to do'?	7.00 (0.00)	7		
(d) Provide simple messages about physical activity?	5.86 (0.90)	5–7		
<i>Guidelines and activity information</i>				
3. Does the toolkit clearly state the amount, type, and intensity of the PAGs?	6.43 (0.53)	6–7		
4. Does the toolkit provide a variety of examples of moderate to heavy intensity activities that:			Require more images of persons with tetraplegia exercising	Refer to response to question no.1.
(a) Reflect what power chair users would enjoy doing?	5.43 (1.72)	2–7		
(b) Reflect what manual chair users would enjoy doing?	6.57 (0.53)	6–7		
(c) Help power chair users meet the PAGs?	5.43 (1.62)	2–7		
(d) Help manual chair users meet the PAGs?	6.57 (0.53)	6–7		
<i>Evidence-based resource</i>				
5. Does the toolkit highlight the most prominent evidence-based:			Risk of inactivity is less evident	Additional information on risks of inactivity will be provided on the website.
(a) Benefits of physical activity for adults with SCI?	6.71 (0.49)	6–7		
(b) Risks of inactivity/activity for adults with SCI?	6.43 (0.79)	5–7		
(c) Barriers to physical activity for adults with SCI that are supplemented with feasible strategies?	6.43 (0.79)	5–7		
<i>Strategies for promoting physical activity</i>				
6. The physical activity resources that currently exist for adults with SCI are represented.	5.86 (0.90)	5–7		
7. The Action Plan examples:				
(a) Are appropriate for helping adults with SCI meet the PAGs?	6.14 (0.69)	5–7		
(b) Provide adults with SCI a variety of ways to meet the PAGs?	6.00 (0.82)	5–7		
<i>Images</i>				
8. The images are:				
(a) Appropriate for adults with SCI not meeting the PAGs?	5.57 (0.79)	5–7		
(b) Encouraging for adults with SCI not meeting the PAGs?	6.00 (0.58)	5–7	Not as encouraging for power chair users.	Refer to response to question no.1.

Abbreviations: PAGs, physical activity guidelines; SCI, spinal cord injury. All the ratings were done on a '1 (completely disagree) to 7 (completely agree) rating scale'.

The knowledge translation plan and resource implications for disseminating the toolkit were also discussed. Suggested methods to disseminate the toolkit included mailing paper copies to partner organizations; creating an online version; posting links on social media; using mass media for broad promotion of the toolkit; and obtaining testimonials from various end users. It was unanimously agreed that it would not be feasible to update the paper copy of the toolkit regularly. Rather, the toolkit would be made available on the SCI Action Canada website, with updates made according to the availability of resources.

When discussing how to ensure that the toolkit is implemented as a routine part of practice, the panel recognized the importance of having SCI Action Canada staff and researchers work with practitioners to ensure the toolkit is strongly linked with a credible source for LTPA information within the SCI community. One expert panel member suggested that the SCI Action Canada logo be visible on the front page of the toolkit so that practitioners can readily distinguish the credibility of the information. The anticipated resource implications of disseminating the toolkit were: printing of paper copies; management of the SCI Action Canada website; availability of service providers for sending members updates; and a greater demand on SCI Action Canada for additional resources, staff, and researchers. Strategies for evaluating and monitoring the uptake of the toolkit included monitoring the distribution of paper copies and using Google analytics to assess online usability of the toolkit. There is no current funding for monitoring the uptake of the toolkit.

Following the meeting, a detailed summary of the recommendations was emailed to the expert panel (one of whom was unable to attend the meeting) to review and revise.

Phase 4: toolkit development. The development of the toolkit proceeded using the panel's content and format recommendations outlined in Table 3 as a framework. A technical writer worked alongside the first author to ensure that the content had clear and concise descriptions, coherent examples of activities and coping strategies and appropriate language for the target audience. A professional photographer and graphic designer were also hired to ensure that the images and formatting met the specific criteria outlined in the panel's recommendations.

To assess whether the content and format recommendations had been adequately addressed in the toolkit, members of the expert panel completed a 20-item questionnaire. Table 4 provides a summary of the panel's feedback. Responses were favorable on all items ($M=6.2$ on a 7-point scale), indicating consistency between the recommendations and the content and overall presentation of the toolkit. One suggestion given by the panel was to include more images of persons with tetraplegia.

Pilot work was also conducted with SCI consumers to assess the clarity of the toolkit for the target audience. Given future plans for disseminating the toolkit to rehabilitation centers, it was important to include both community-

Table 5 Feedback from consumers with SCI on the content of the toolkit (n = 6) and following the developing of the full version (n = 9)

<i>Toolkit content (n = 6)</i>	<i>Suggested improvements</i>	<i>Response to feedback</i>	
<i>Guidelines</i>	Add information on hydration and links to activities	Hydration is included in the safety tips; links to the Canadian Paralympic Committee Portal and the Get In Motion service are included. Additional links will be included on the website.	
	More detail needed to clarify intensity	An intensity rating scale has been added to the first page.	
<i>Activity examples</i>	Inclusion of specific activity examples: for example, yoga, curling and bowling	Selected activities are included in the paper copy while additional examples will be provided on the website.	
	Review the use of the term 'power' for certain sport examples	All terms for sport examples have been clarified.	
	More detail needed to distinguish speedy cycle from hand cycle	Speedy cycle has been omitted as it is redundant to the term hand cycle.	
	More detail on how to do activities	'How to' information and videos will be included online.	
<i>Action planning</i>	Add information regarding: making activity plans with others, and how to self-monitor	Planning with others has been added to the 'How to make your plan sticky' section of the toolkit, while self-monitoring information will be included on the website.	
<i>Coping strategies</i>	Add information for: being active with friends, trying different things, locating equipment	Additional coping strategies and links to corresponding information will be included on the website.	
<i>Full version of the toolkit (n = 9)</i>	<i>Agreement</i>	<i>Suggested improvements</i>	<i>Response to feedback</i>
<i>Overarching objectives</i>			
1. Toolkit appropriate for all healthy adults with SCI not meeting the PAGs?	100%	(N/a)	–
2. Does the toolkit reflect the overarching message that 'physical activity is easy and fun to do'?	100%	Emphasize the importance of being healthy and fit, getting out and trying things, and the social aspect of activity	Health/fitness emphasized in the benefits section; social aspect is emphasized in the activity and coping strategy examples.
3. Is it clear how much physical activity individuals should be doing?	100%	Review the language in the 'Aim For' section	The language in this section has been clarified.
4. Does the toolkit provide a variety of examples of moderate to heavy intensity activities for power chair and manual chair users that are:			
(a) Easy to understand?	100%	Review the accessibility of the suggested activities and the appropriateness of activities for older population	A variety of activity examples are provided in the toolkit
(b) Realistic for helping people to achieve the PAGs?	56%	Inclusion of more activities; provide little to no-cost sports examples; emphasize skills	A more detailed activity list and 'how to' description will be provided online.
(c) Reflective of what people enjoy doing?	78%		
<i>Content satisfaction</i>			
5. Are the benefits identified of value?	100%	Move the benefits section to the first page	PAGs will remain on the first page as the toolkit is a resource to complement them.
		May not be realistic to expect transfers to be easier after engaging in physical activity	Benefits are linked with evidence for engaging in moderate to vigorous intensity aerobic and strengthening activity
6. The Action Plan examples:			
(a) Are clearly written?	100%	Include insert of an Action Plan calendar	Current funding permits a 4-page resource; future funding may be required to enhance the toolkit.
(b) Provide a variety of ways to meet the PAGs?	100%	Include 'paved surfaces' when mentioning park/trails	The general term for these locations will be used.
(c) Are appropriate for helping adults with SCI meet the PAGs?	78%	Mention recreation centers for the winter season	More action plan examples are provided on the website.

Table 5 (Continued)

Toolkit content (<i>n</i> = 6)	Suggested improvements	Response to feedback	
7. The coping strategies are useful for overcoming common barriers?	88%	Include coping strategies for low self-efficacy, pain and transportation Avoid the use of blue background on white text	Coping strategies for these barriers have been added to the toolkit. Blue background has been changed to a maroon color.
<i>Presentation</i>			
8. The images are appropriate and encouraging for adults with SCI not meeting the PAGs?	78%	Include photos of individuals with higher-level injuries and older age segment	Photos of these groups are included on page 2 and 4 of the toolkit.
9. Does the toolkit use language that is appropriate for the target audience?	100%	Needs to be less 'busy'; simplify information	More photos/less text are now included in the toolkit
10. Does the toolkit have an appropriate title?	56%	Use full-term for SCI in the title; consider the term 'pamphlet' versus 'toolkit'	'SCI' and 'toolkit' will remain until further evaluation of the toolkit
<i>Perceived utility</i>			
11. Will individuals with SCI use this toolkit as a resource?	56%	Increase font size Simplify information Needs to be longer Include an index to organize the content Refer people to one main website; provide a place for people to access this resource (for example, website)	Font size has been increased. Text in certain sections (for example, action plan examples) is reduced. Current funding permits a 4-page toolkit; future funding may be required to enhance the toolkit. SCI Action Canada website is the main website referred to in the toolkit and provides a section for people to access the toolkit
12. I would use this toolkit?	89%	Include toolkit as part of a farewell package when patients leave rehabilitation	Future research and funding will be required to examine this option.
13. Additional concern(s) with the toolkit?	NA	Pare down the autonomic dysreflexia (AD) and orthostatic hypotension (OH) sections	AD section has been reduced, while the OH section is only included in the online version.

Abbreviations: PAGs, physical activity guidelines; SCI, spinal cord injury, NA, not applicable.

Note. The % agreement was determined through a content analysis of the transcriptions obtained from the telephone interviews and focus group with the nine participants.

dwelling consumers and inpatients for this pilot work. Table 5 summarizes the feedback obtained from consumers and the modifications subsequently made to the toolkit. Briefly, the consumer sample ($N = 15$; 67% male; $M_{age} = 53.0$ years ± 13.4) included persons with tetraplegia (47%) and paraplegia (47%), as well as manual (80%) and power chair users (7%), and those who used a walker (13%) as their primary mode of mobility. The majority were community-dwelling consumers (80%), while the remaining were acute inpatients (20%). Six consumers participated in an interview to discuss the content of the toolkit, while the remaining nine consumers participated in either a 30–45 min semistructured focus group ($n = 4$) or telephone interview ($n = 5$) to provide feedback on the full version of the toolkit (see Figure 1). Similar to the expert panel, consumers found the content to be appropriate and the images to be encouraging for assisting adults with SCI in achieving the PAGs. Consumers' concerns were related to formatting (for example, font size, length), the appropriateness of activities and images for adults with higher-level injuries and/or older population and barriers (for example, transportation, transferring) to some of the suggested activities. The final version of the toolkit is presented in Figure 2.

DISCUSSION

Using an internationally accepted, rigorous systematic consultation process,^{5–7} our group was able to develop the first-ever, evidence-

informed resource to assist adults with SCI in achieving the PAGs.⁴ The expert panel's recommendations were fundamental for guiding the development and future dissemination of the toolkit. Our toolkit is anticipated to have important implications for a variety of stakeholders. For consumers with SCI, the toolkit will increase awareness and knowledge of the SCI PAGs and behavioral strategies for engaging in LTPA. For health care professionals, the toolkit provides an evidence-based resource that can be implemented into routine practice to facilitate discussion of LTPA and exercise prescription among clients with SCI. For policy makers, the toolkit can be used as an advocacy tool to inform policies on improving LTPA opportunities for persons with SCI, such as enhancing access to and accessibility of fitness and recreational facilities.

Dissemination barriers and facilitators

For consumers with SCI, the main barrier is reaching individuals not linked to organizations that would use health care services. One facilitator considered by the panel was to create broad awareness of the toolkit via mass media. For health care professionals and service providers, issues were raised relating to time constraints, competing service demands to provide clients with a variety of health-related

Physical activity guidelines

Activities and benefits

Action planning

Coping strategies and safety tips

Figure 2 The SCI Get Fit Toolkit. A full color version of this figure is available at the *Spinal Cord* journal online.

information and uncertainty regarding the optimal time to introduce the toolkit in acute practice. The facilitators identified to overcome these barriers included: consumer education, advocacy for the use of the toolkit in practice by respected health care champions and publishing information about the toolkit in medical journals and magazines. The panel also advised that a fact sheet be developed that describes how to use the toolkit in acute practice.

Strengths and weaknesses

The strengths of this work include the systematic process⁵⁻⁷ used to develop the recommendations, the eclectic background of our panel, which included experts from a variety of disciplines, institutions and organizations, and the participatory methodology used to develop the toolkit. SCI consumers from the community and rehabilitation, as well as the expert panel members, were given the opportunity to provide feedback on the toolkit over the course of its development. This type of community-vetted approach is fundamental to developing resources that are of interest to the target audience and sustainable within the community.¹⁸ To our knowledge, there is no other LTPA resource available for the SCI community that is both

evidence-based and developed in consultation with consumers. The integrated research-knowledge mobilization approach that was used to develop the toolkit provides a template for developing effective health promotion materials in other populations.

Next steps

Panel members will work with community partners to disseminate the toolkit across Canada. The project leads are currently working towards a French translation of the toolkit to enhance the reach of the toolkit across Canada. Additional funding will be sought for large-scale dissemination of the toolkit to rehabilitation centers and health care professionals. Such funding will provide the opportunity to evaluate the population-level impact of the toolkit on the awareness of the PAGs, the percentage of adults with SCI meeting the PAGs and monitoring changes in routine practice.

DATA ARCHIVING

There were no data to deposit.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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- 1 Hicks AL, Martin Ginis KA, Pelletier CA, Ditor DS, Foulon B, Wolfe DL. The effects of exercise training on physical capacity, strength, body composition and functional performance among adults with spinal cord injury: a systematic review. *Spinal Cord* 2011; **49**: 1103–1127.
- 2 Wolfe DL, Martin Ginis KA, Latimer AE, Foulon BL, Eng JJ, Hicks AL *et al*. Physical activity and SCI. In: Eng JJ, Teasell RW, Miller WC, Wolfe DL, Townson AF and Hsieh JTC *et al*. (eds). *Spinal Cord Injury*, 2010, Rehabilitation Evidence. Version 3.0.
- 3 Martin Ginis KA, Latimer AE, Arbour-Nicitopoulos KP, Buchholz AC, Bray SR, Craven C *et al*. Leisure-time physical activity in a population-based sample of people with spinal cord injury Part I: demographic and injury-related correlates. *Arch Phys Med Rehabil* 2010; **91**: 722–728.
- 4 Martin Ginis KA, Hicks AL, Latimer AE, Warburton DER, Bourne C, Ditor DS *et al*. The development of evidence-informed physical activity guidelines for adults with spinal cord injury. *Spinal Cord* 2011; **49**: 1088–1096.
- 5 Brouwers MC, Kho ME, Browman G, Burgers J, Cluzeau F, Feder G *et al*. AGREE II: advancing guideline development, reporting and evaluation in health care. *CMAJ* 2010; **182**: E839–E842.
- 6 Brouwers MC, Kho ME, Browman G, Burgers J, Cluzeau F, Feder G *et al*. AGREE II: advancing guideline development, reporting and evaluation in healthcare. *J Clin Epidemiol* 2010; **63**: 1308–1311.
- 7 Brouwers MC, Kho ME, Browman G, Burgers J, Cluzeau F, Feder G *et al*. AGREE II: advancing guideline development, reporting and evaluation in healthcare. *Prev Med* 2010; **51**: 421–424.
- 8 Brawley LR, Latimer AE. Physical activity guides for Canadians: messaging strategies, realistic expectations for change, and evaluation. *Can J Public Health* 2007; **98**: S170–S184.
- 9 Latimer-Cheung AE, Tomasone JR, Rhodes RE, Kho M, Nausti G, Gainforth HL *et al*. Developing evidence-based messages for translating physical activity guidelines into practice. *Ann Behav Med* 2012; **43**: S93.
- 10 Foulon BL, Lemay V, Ainsworth V, Martin Ginis KA. Enhancing the uptake of physical activity guidelines: a needs survey of adults with spinal cord injury and health care professionals. *Adapt Phys Activ Q* 2012; **29**: 329–345.
- 11 Martin Ginis KA, Latimer AE, Hicks AL, Craven BC. Development and evaluation of an activity measure for people with spinal cord injury. *Med Sci Sports Exerc* 2005; **37**: 1099–1111.
- 12 Arbour-Nicitopoulos KP, Martin Ginis KA, Latimer AE. Turning intentions into action: Combined effects of action and coping planning on leisure-time physical activity and coping self-efficacy in persons living with spinal cord injury. *Arch Phys Med Rehabil* 2009; **90**: 2003–2011.
- 13 Latimer AE, Martin Ginis KA, Arbour KP. The efficacy of an implementation intention intervention on promoting physical activity among individuals with spinal cord injury: a randomized controlled trial. *Rehabil Psychol* 2006; **51**: 273–280.
- 14 Hicks AL, Martin KA, Ditor DS, Latimer AE, Craven C, Bugaresti J *et al*. Long-term exercise training in persons with spinal cord injury: effects on strength, arm ergometry performance and psychological well-being. *Spinal Cord* 2003; **41**: 34–43.
- 15 Scelza WM, Kalpakjian CZ, Zemper ED, Tate DG. Perceived barriers to exercise in people with spinal cord injury. *Am J Phys Med Rehabil* 2005; **84**: 576–583.
- 16 Martin Ginis KA, Arbour-Nicitopoulos KP, Latimer AE, Buchholz AC, Bray SR, Craven C *et al*. Leisure-time physical activity in a population-based sample of people with spinal cord injury Part II: activity types, intensities, and durations. *Arch Phys Med Rehabil* 2010; **91**: 729–733.
- 17 Health Canada and the Canadian Society of for Exercise Physiology 1998, Canada's physical activity guide for healthy active living. Cat. no. H39-429/1998-1E. Health Canada. Ottawa, ON, Canada.
- 18 Minkler M. Community-based research partnerships: Challenges and opportunities. *J Urban Health* 2005; **82**: ii3–ii12.