PROTOCOL TITLE:

The Scleroderma Patient-centered Intervention Network - Scleroderma Support group Leader EDucation (SPIN-SSLED) Program Trial

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1. THE NEED FOR A TRIAL

1.1 What is the problem to be addressed?

People with rare diseases face the same challenges as those with more common diseases plus unique challenges, including limited disease education and lack of specialized support options.[1-12] Professionally organized support services for common diseases are often available through the healthcare system,[13,14] but are not typically available in rare diseases.[10,15] As a result, many people with rare diseases look to peer-led support groups for disease-specific education and support.[16-20]

Table 1: Abbreviations

CONSORT	Consolidated Standard of Reporting Trials
ICC	Intra-class Correlation Coefficient
PHQ-8	Patient Health Questionnaire-8
OLBI	Oldenburg Burnout Inventory
PN-RCT	Partially Nested Randomized Controlled Trial
RCT	Randomized Controlled Trial
SSc	Systemic Sclerosis
SPIN-SSLED Program	SPIN Scleroderma Support group Leader EDucation Program
SPIN	Scleroderma Patient-centered Intervention Network
SSGLSS	Scleroderma Support Group Leader Self-efficacy Scale
VSI	Volunteer Satisfaction Index

Support groups provide important benefits to people with burdensome medical conditions, based on the principle that people who face similar challenges can empower one another through emotional and practical support.[14,21] Support groups may be held face-to-face or online, led by professionals or peers, and have a structured or an unstructured format. Activities typically involve an educational or information-shar ing component and the exchange of emotional and practical support.[14,18-22]

Systemic sclerosis (SSc), or scleroderma, is a rare, chronic, autoimmune connective tissue disease characterized by abnormal fibrotic processes and excessive collagen production.[23-25] Peer-led support groups play an important role for many people with SSc.[17,26] Currently, there are approximately 275 leaders and co-leaders affiliated with our partners: Scleroderma Canada and Canadian provincial organizations, including Sclérodermie Québec; the Scleroderma Foundation (United States); Scleroderma & Raynaud's UK; Scleroderma Australia and Australian state organizations; and Scleroderma New Zealand; almost all are led by people with SSc.[27-30] Many people with SSc, however, cannot access support groups, and many initiated support groups are not sustained due to challenges that could be addressed via leader training.[18,19] Our partner organizations are committed to improving support group quality and access by providing training to existing support group leaders and to new leaders so that they can start groups in underserved areas and via the Internet. Our Scleroderma Patient-centered Intervention Network (SPIN) team has partnered with patient organization leaders and a team of scleroderma support group leaders to develop the Scleroderma Support group Leader EDucation (SPIN-SSLED) Program. The program is a 3-month group videoconference training program, designed to improve skills and self-efficacy, reduce burden, and reduce emotional distress among support group leaders. Our organizational partners have worked with us to develop the program, and they plan to provide the program to support group leaders post-trial.

We recently completed a feasibility trial of the SPIN-SSLED Program,[31] we are requesting ethical approval to conduct a full-scale trial of the SPIN-SSLED Program.

1.2 What are the principal research questions to be addressed? We will evaluate the effect of the SPIN-SSLED Program on support group leaders' self-efficacy (defined as their perceived ability to carry out actions needed to be successful in support group leadership),[32] burnout, satisfaction with leading a support group, and emotional distress.

1.2.1. Primary objective: To evaluate the effect of the SPIN-SSLED Program on support group leaders' self-efficacy, measured by the Scleroderma Support Group Leader Self-efficacy Scale **(**SSGLSS)[33] post-intervention.

1.2.2. Secondary objectives: To evaluate the program's effects on (1) the SSGLSS[33] at 3 months post-intervention; (2) burnout, measured by the Oldenburg Burnout Inventory (OLBI)[34,35] post-intervention and at 3 months post-intervention; (3) leader satisfaction that leading a group is helping others, measured by the participation efficacy subscale of the Volunteer Satisfaction Index (VSI)[36] post-intervention and at 3 months post-intervention; and (4) emotional distress, measured by the Patient Health Questionnaire-8 (PHQ-8)[37,38] post-intervention. In addition, we will evaluate participant satisfaction among those randomized to the program via the Client Satisfaction Questionnaire-8 (CSQ-8) post-intervention.[39,40]

1.3 Why is a trial needed now? Peer support interventions increase positive health behaviours, self-efficacy for disease management, and mental health.[41-44] In common diseases, peer support services are often organized through the healthcare system,[13,14] but these services are less accessible to people with rare diseases.[15] One reason is that there are major obstacles to evaluating and delivering organized support (e.g., support groups, peer support) for people with rare diseases. We searched PubMed using the names of the approximately 7,000 rare diseases listed in Orphanet's Orphadata[45] but did not find a single trial of an organized support program for patients with any rare disease.[46]

Between 15,000 and 20,000 Canadians are affected by SSc,[47] a rare, chronic, autoimmune connective tissue disease.[23-25] Onset typically occurs between the ages of 30 and 50 years, and approximately 80% of people with SSc are women. Abnormal fibrotic processes that occur in SSc can affect multiple organ systems, including the skin, lungs, gastrointestinal tract, and heart and can cause immune dysfunction and vascular injury.[23-25] Common manifestations include Raynaud's phenomenon,[48] esophageal disease and gastrointestinal symptoms, [49,50] and pulmonary disease.[25] People with SSc commonly experience hand function and mobility limitations, pain, fatigue, sleep problems, pruritus, depression, and body image distress from disfigurement (e.g., skin tightening, pigment changes, hand contractures, telangiectasias).[51-62] Presentation is extremely heterogeneous, and course is highly unpredictable.[23-25]

While many people with SSc rely on support groups in order to learn how to better manage physical and emotional aspects of living with the disease, the majority of SSc patients are not able to access these groups.[17-20,27-30] Currently, there are only a handful of support groups delivered via teleconference or videoconference.[27-30] As such, people with SSc must live close enough to a local group and be able to travel to participate.[18,19] When local groups do exist, they are sometimes disbanded due to the leader's health worsening or to issues related to untrained peer leaders. Some patients prefer not to attend SSc support groups because the group in their area is poorly organized or is overly negative.[18,19] Our research in SSc and research in other diseases, including cancer, has established that leading a support group poses significant challenges and a high level of burden for patient leaders, often resulting in burnout. Peer leaders of illness-based support groups report challenges that include practical

difficulties, such as a lack of resources or poor coordination with medical professionals; difficulties with group leadership tasks, such as managing complex group dynamics or dealing with the worsening health or death of group members; and personal challenges, such as balancing personal and group demands, preventing burnout and stress, and managing one's own health condition while supporting others.[18-20,63-67] These challenges are magnified for peer leaders of rare disease support groups, who also face logistical problems related to small numbers of potential group members, even in urban settings, and limited support from healthcare and patient organizations, which are not as well-resourced as organizations for people with more common diseases, such as cancer, heart disease, or arthritis.[20,46]

By providing key knowledge and skills, the SPIN-SSLED Program could improve the ability of SSc peer support group leaders to lead sustainable, effective support groups; reduce emotional and physical toll on leaders; and encourage new leaders to set up support groups where none exist, locally or via the Internet. The program will be delivered by videoconference because in rare diseases, including SSc, support group leaders are widely dispersed geographically. Videoconferencing has been used successfully to train educators, therapists, other health service providers, and parents of children with behavioural difficulties, for instance.[68-74] Systematic reviews have found that training healthcare service providers via videoconferencing achieves similar learning outcomes as traditional face-to-face models.[73,74] Most SSc patients use the Internet. As an example, a 2013 study[75] found that 85% of Dutch SSc patients used the Internet to search for information about SSc. In Canada, SPIN[15] uses Internet-based data collection methods to support an international SSc patient cohort (N > 2000) and is currently testing patient self-management tools delivered via the Internet.[76,776]

1.3.1 Evidence from systematic reviews: We conducted a systematic review of trials that evaluated the effects of training programs for patient leaders of illness-based support groups on the competency, self-efficacy, burden, and emotional well-being of group leaders.[78] Only one RCT met inclusion criteria. That study evaluated confidence and self-efficacy of cancer support group leaders randomized to either 4-month long high-resource (N = 29; website, discussion forum, 2-day face-to-face training) or low-resource (N = 23; website, discussion forum) interventions. The RCT did not find evidence that the high-resource program was more effective. However, the trial was substantially underpowered, not enough information was provided to determine intervention content or how it was delivered, and the risk of bias was high due to methodological limitations. We updated the systematic review through June 4, 2018, but did not identify any additional trials.[79]

1.3.2. Patient interviews and scleroderma support group survey: Prior to developing the SPIN-SSLED Program, to assess need and inform program development, we sought information on (1) reasons why people with SSc attend or do not attend support groups, (2) the perceived benefits and limitations of participating in support groups, and (3) the training and support needs of SSc support group leaders. To do this, our team, which includes researchers, leaders from our partner patient organizations, and a Support Group Leader Advisory Team of 10 SSc support group leaders, conducted a series of studies.[17-20]

We first conducted one-on-one interviews with 30 SSc support group leaders, group members, and non-attenders. Then, we developed and disseminated the Scleroderma Support Group Survey. We generated an initial item pool from our interviews and from surveys done with support groups in more common diseases. We worked with our Advisory Team to edit individual items, delete repetitive items or items less relevant for SSc, and generate new items to reflect content important to SSc that were not reflected in the initial item pool. We disseminated the survey to SSc support group leaders, members, and non-attenders from North America and internationally via (1) postings on SSc organization

websites and other social media venues (e.g., Facebook, Twitter); (2) announcements in SSc patient newsletters; (3) emails to support group leaders and members; and (4) postings in SSc-related chat rooms. Approximately 600 North American patients and 700 SSc patients from other parts of the world completed the survey (approximately 45% non-attenders, 40% group members, and 15% leaders).[17-20]

From the interviews and survey,[17-20] we learned that important reasons for attending SSc support groups include giving and receiving emotional and practical support, learning how to manage SSc-related challenges, feeling supported by others with a rare disease, and learning about SSc and SSc research from group members and guest speakers. We learned that many people with SSc do not attend support groups due to factors that include not having access to a local support group, being too ill or disabled to travel, and negative perceptions about support groups (e.g., they are too negative, would not provide useful information). Support group leaders consistently reported difficulty performing tasks necessary to successfully initiate and sustain the groups (e.g., publicizing the group), coping with the emotional demands of leading the group, and managing complex group dynamics. Among support group members, 88% indicated that it was important that groups have trained leaders.

Thus, our research made it clear that there is a need for a well-designed and executed trial of a training program for peer leaders of SSc support groups. We recently completed a feasibility trial[31] that demonstrated that delivering the SPIN-SSLED Program is highly feasible and that it meets the training needs of support group leaders. It also provided preliminary evidence that the program has the potential to improve self-efficacy for carrying out leadership tasks, reduce burden on leaders, and improve emotional distress levels in leaders (see section 2.19 for details of SPIN-SSLED Feasibility Trial).

1.4 How will the results of this trial be used? The preliminary research we have conducted, including our feasibility trial, and the SPIN-SSLED Trial, comprise an *integrated knowledge translation* process, in which researchers and stakeholders work together to define research questions, determine the most appropriate methodology, collect data and interpret findings, and disseminate results (www.cihr-irsc.gc.ca/e/45321.html#a3). Our main patient organization partners, Scleroderma Canada and the Scleroderma Foundation, with whom we have a long history of collaboration, are working with our team to ensure that as many people with SSc as possible have consistent access to effective support group services. We have worked closely with them and with our Support Group Leader Advisory Team to design each stage of preliminary research, the SPIN-SSLED Program, and the SPIN-SSLED feasibility and full-scale trials. Recently, patient organizations from the United Kingdom, Australia, and New Zealand joined our team.

Once tested, SPIN-SSLED will be the only peer support group leader training program that has been evaluated in a well-conducted RCT in any disease. If effective, the SPIN-SSLED Program will be implemented immediately by Scleroderma Canada and all other patient organization partners to train and certify peer support group leaders. These organizations have committed to support ongoing training and to provide logistical and other support to groups with certified leaders. Beyond SSc, the SPIN-SSLED Program will be easily adapted for use in other diseases, and our team is committed to working with organizations outside of SSc to develop capacity to provide training for support group leaders.

1.5 Are there any risks or benefits for participants involved in the trial? The proposed trial intervention is of minimal risk. We do not anticipate any safety concerns with the use of the SPIN-SSLED Program. Participation in the SPIN-SSLED Trial will involve weekly online training sessions, completion of online measures, and participation in a post-program interview. Although it is hypothesized that the SPIN-SSLED Program will improve leaders' self-efficacy for performing leader tasks, reduce burnout, and reduce emotional distress, it cannot be guaranteed that leaders will receive

any benefits from this study. However, information learned from this research may lead to more effective SSc support group leader training, which may in turn benefit those living with SSc in the future or people with other diseases. There will be no financial compensation for leaders who are participating in the SPIN-SSLED Trial.

1.6 Will participants receive a compensation for their participation in the trial? No compensation is offered to take part in the SPIN-SSLED Trial.

2. THE PROPOSED TRIAL

2.1 What is the proposed trial design? The proposed study will be a pragmatic RCT that tests whether the SPIN-SSLED Program improves support group leader outcomes compared to leaders assigned to a waitlist control. Pragmatic RCTs differ from explanatory or mechanistic trials in that they are intended to test the effectiveness of adding an intervention to routine practice in order to inform practice and policy decisions rather than explain intervention mechanisms.[80-82]

Support group leaders assigned to the SPIN-SSLED Program will be individually randomized and then clustered into training groups. Members of each training group will interact during videoconference training modules. Support group leaders assigned to the waitlist control will not be clustered. They will be randomized individually and will only complete trial measures. A standard cluster RCT design is used when interventions are delivered to groups, rather than individuals, in order to account for dependence between individuals within clusters.[83-85] The SPIN-SSLED Trial will need to account for clustering in the intervention arm, but not the control arm. Thus, we will use a partially nested RCT trial design (PN-RCT).[86-88] The PN-RCT design is a hybrid between a conventional RCT with individual participant randomization and a cluster RCT, in which pre-existing clusters (e.g., primary care practices) are randomized to intervention or control arms. In the PN-RCT design, analyses account for dependence within intervention arm clusters, but treat participants assigned to the control arm individually, as in a conventional RCT.[86-90] Although less common in medical research, PN-RCTs are used extensively in educational and behavioural research.[86]

The reason that we will use a waitlist control group that will receive the program post-trial is that our patient organization partners are invested in providing the training program, regardless of trial outcomes, for reasons of organizational liability and in order to support their support group leader community, the members of which have expressed a strong desire to receive training.

The trial will be registered prior to patient enrollment (clinicaltrials.gov) and will be reported in accordance with standards articulated in the Consolidated Standard of Reporting Trials (CONSORT) statement[91,92] and CONSORT extensions for nonpharmacologic trials,[93] cluster trials,[83] pragmatic trials,[80] and e-health trials.[94]

2.2 What are the planned trial interventions? The SPIN-SSLED Program uses a problem-based learning approach, which is a learner-centered approach that integrates theory and practice by providing necessary knowledge and skills, presenting complex, real-world problems, and working to identify approaches to solving problems.[95-98] Each module, or learning session, will introduce a topic and provide an overview of key information. In modules that involve managing group or individual interactions, videos that we recorded with members of our Support Group Leader Advisory Team will show SSc support group leaders faced with a problem or situation similar to those that training group participants may encounter in their role as a support group leader. Then, there will be a guided discussion among training group participants about possible approaches and solutions.

The SPIN-SSLED Program includes 13 modules that are delivered via videoconference over the course of the 3-month program in weekly 60- to 90-minute sessions. Module topics include (1) The Leader's Role; (2) Starting a Support Group; (3) Structuring a Support Group Meeting; (4) Scleroderma 101; (5) Successful Support Group Culture; (6) Managing Support Group Dynamics; (7) Loss and Grief: The Support Group Leader; (8) Loss and Grief: Supporting Group Members; (9) Advertising and Recruitment for the Support Group; (10) The Continuity of the Group; (11) Supporting Yourself as a Leader; (12) Remote Support Groups; and (13) Transitions in Support Groups. See Appendix 1 for an overview of module content, Appendix 2 for the training manual, Appendix 3 for the participant manual, and Appendices 4-6 for example module PowerPoint slides.

All English-language SPIN-SSLED training groups will be facilitated by one instructor, and the French-language training groups will be facilitated by a second instructor. In addition to the live modules, SPIN-SSLED Program participants will receive a manual that summarizes didactic material from sessions. Based on our previous experience and consistent with previous trials of videoconference training, 6 support group leaders will be assigned to each training group to maximize effective interaction and participation.[68-71] Training sessions will be delivered using the GoToMeeting® videoconferencing platform, a high-performance platform that has been used successfully in similar applications[72,99,100] and that was used successfully in the SPIN-SSLED Feasibility Trial[31] (see section 2.19). Participants will receive an instruction guide relating to the use of the videoconferencing platform to ensure that everyone can log in successfully (see Appendix 7 for the instruction guide). In addition to the videoconference sessions, participants will have access to the secure, monitored SPIN-SSLED online forum to interact with other participants about program content. (See Appendices 8-10 for forum guidelines and the instruction guide on how to use the chatroom and access session recordings). Participants will also have access to an online resource center containing videos and educational activities that leaders can use during their support group meetings (see Appendix 11 for screenshots of the website).

All SPIN-SSLED sessions will be video-recorded and audited for fidelity to the program manual by two members of the research team. We will use standard methods for evaluating intervention fidelity,[101] including observation of entire sessions for a randomly selected sample of 25% of sessions. Raters will evaluate adherence to each session's goals and content. Consistent with best-practice recommendations for assessing treatment fidelity,[101] this will be done using a checklist based on a standardized format adapted for the specific components of the SPIN-SSLED Program manual.

Participants allocated to the waitlist control will be informed that the SPIN-SSLED Program will be provided to those on the waitlist at the end of the trial. During the trial, they will complete trial measures but will not receive any active intervention as part of the trial.

2.3 What are the proposed practical arrangements for recruitment, consent, and allocation of participants to trial groups? At the initiation of the trial, our partners from Scleroderma Canada and Canadian provincial organizations, including Sclérodermie Québec; the Scleroderma Foundation in the United States; Scleroderma & Raynaud's UK; Scleroderma Australia and Australian state organizations, and Scleroderma New Zealand will contact group leaders to describe the SPIN-SSLED Program and will provide the SPIN team with a list of eligible support group leaders. The description will also contain a link to the public SPIN-SSLED page on SPIN's website (www.spinsclero.com/projects/spin-ssled). This webpage describes the SPIN-SSLED program and presents both written and video testimonials from participants that have participated in the feasibility

trial. Additionally, there is also a video introducing and explaining how the program came to be. (See Appendix 12 for a screenshot of the webpage and links to the webpage videos)

SPIN-SSLED personnel will then send an email invitation with a link to a Qualtrics survey containing the consent form, a demographic questionnaire with information about participants' support group experience (e.g., years of experience or new leader), and questions regarding the days and times when the interested group leaders could attend training sessions. In addition to describing the study, the consent form will explain (1) that some group leaders who enroll in the study will be randomly selected every 3 months to participate in the SPIN-SSLED Program and that some others will be allocated to a waitlist; (2) that participants randomized to participate in the program plus those allocated to the waitlist will complete measures online at the time of randomization post-intervention, and 3 months post-intervention; (3) that, depending on the number of leaders who enroll, it is possible that some group leaders who enroll will not be selected to receive the training nor be asked to complete trial measures as part of the control group; and (4) that, enrolled participants who do not receive the training as part of the trial, either because they are selected for the waitlist or because they are not selected for the training group or the waitlist, will be offered the training post-trial per our agreement with our partner patient organizations. For existing support groups with more than one leader, one co-leader will be specified as the primary participant and any others as secondary; only one leader per support group will be eligible for inclusion in the trial, and the secondary leaders will only be enrolled if the primary leader day and time availabilities do not match those that are able to be provided in the trial. Interested leaders will be provided contact information for SPIN-SSLED trial personnel, who will answer any questions they may have during the consent process and over the course of the trial. At the initiation of the trial, we will send up to 3 emails, one per week, to leaders who do not respond to the initial email or enroll in the trial.

There will be 15 total training groups offered. We will deliver the program to 3 training groups simultaneously. Thus, the intervention will be delivered in 5 "waves" with 3 training groups of 6 participants each per wave, plus 18 participants randomized to the waitlist control per wave. Prior to starting a new wave, we will email participants who have not yet been selected for participation in a prior wave to allow them to update their available days and times. We will then determine characteristics (language, day, time) of the training groups that are needed for the new wave.

Interested leaders who provide consent for participation will be entered into different pools based on their availabilities. For each wave, the random selection of leaders to be allocated to the intervention and waitlist trial arms will be conducted by a third-party centralized randomization service, the Griffith Randomisation Service (https://www151.griffith.edu.au/). External centralized randomization will ensure that the allocation sequence is concealed and not able to be influenced by study investigators.[101] For each of the 3 new training groups within each wave, SPIN-SSLED personnel will provide the Griffith Randomisation Service with an anonymized list of participants (only ID numbers will be provided) who could participate in the training group based on their day and time availabilities. For each of the 3 groups, the service will randomly select 12 participants from the pool of enrolled group leaders available during the designated day and time for the group and will randomly allocate the 6 to the training group and 6 to the waitlist group using block randomization. To maximize sharing of experiences in groups, we will limit the number of new group leaders without prior experience to 1-2 per training group, depending on the number of new leaders who enroll (to be determined). Thus, the maximum number of new leaders per 12 selected will be either 2 or 4, and randomization will be stratified by new and existing leaders.

All 12 leaders (training group = 6, waitlist= 6) will receive an email invitation including a clickable link to the online survey platform Qualtrics, where they will be asked to complete the study baseline measures. This email will also communicate participants' assignment to the training program or waitlist control. A second email will be sent to leaders allocated to the training group with the date and time of their first training session, the topic of the first session, the program manual, and information on how to login to the SPIN-SSLED videoconferencing system and online chatroom.

2.4 What are the proposed methods for protecting against sources of bias? A potential concern is that participants will not be blinded to intervention status. In most pragmatic trials of training, education, or behavioural interventions, participants cannot be blinded. This is understood as part of the response to being offered a treatment, similar to what occurs in clinical practice.[80-82] A second concern relates to the potential for contamination if participants randomized to the SPIN-SSLED Program share learning material with participants in the waitlist control. It is not likely that material would be shared between leaders from different support groups. Nonetheless, to attempt to minimize the influence of possible contamination, we will explain this concern to participants in the training arm of the trial and ask them not to share their material or discuss the training sessions with other group leaders.

2.5 What are the planned inclusion/exclusion criteria? There are currently approximately 275 leaders or co-leaders affiliated with our partner patient organizations, not counting potential new group leaders. To be eligible, support group leaders must be on one of our partner organizations' lists of current or potential leaders, must be able to use the Internet to access training sessions, and must be able to complete study questionnaires online. In addition to these requirements, we will only enroll one support group leader per support group. In the case where there are multiple leaders for a single group, the co-leaders must come to a decision together on who they would like to be the primary leader and prioritized for enrolment. The leader(s) designated as secondary will only be enrolled if the primary leader in the group does not have any day and time availabilities that match what is offered as part of the trial. Those that are designated as secondary and who do not undergo training will be placed in a separate waitlist to undergo training post-trial.

2.6 What is the proposed duration of treatment period? The program consists of 13 modules that will be delivered weekly over a 3-month period.

2.7 What is the proposed frequency and duration of follow up? Trial outcomes will be assessed at the time of randomization, 3 months later (post-intervention), and 6 months later (3 months post-intervention).

2.8 What are the proposed primary and secondary outcome measures? A demographics questionnaire will be administered to all participants (intervention group and waitlist group) before the trial. The demographics questionnaire designed for this study includes basic demographic information, such as gender, age and employment status. The questionnaire also includes disease-related variables, such as years since scleroderma diagnosis and questions relating to participant's leadership role, such as years in role as support group leader or status as a new leader.

2.8.1. Primary outcome: The primary outcome analysis will compare SSGLSS[33] scores between group leaders allocated to the SPIN-SSLED Program versus the waitlist control post-intervention. The SSGLSS is a 32-item scale designed to assess SSc support group leader confidence to successfully perform leader tasks (e.g., organizational skills), manage group and interpersonal interactions, and balance group leadership and self-care needs. The measure reflects the core educational content of the

SPIN-SSLED Program. It utilizes a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with higher total scores indicating greater self-efficacy.

We developed the SSGLSS with our Support Group Leader Advisory Team and validated it via our patient surveys (see section 1.3.2). Prior to the development of the SSGLSS, there were no existing measures of support group leader self-efficacy. We validated the SSGLSS[33] in two samples of SSc support group leaders (N = 102, N = 55) and found that it had good internal consistency (Cronbach's alpha 0.96 and 0.95) and hypothesis-consistent convergent validity with a burnout measure, the OLBI.[33,34] In our feasibility trial,[31] SSGLSS pre-post difference was large among participants (standardized mean difference = 1.70; 1.1 point difference per item), suggesting sensitivity to change and further supporting its validity (see section 2.19).

2.8.2. Secondary outcomes: Secondary outcomes include the SSGLSS 3 months post-intervention and other outcome measures post-intervention and 3 months post-intervention. Leader burnout will be measured by the OLBI, which has been validated in diverse populations (16 items, 4-point scale from 1 = strongly disagree to 4 = strongly agree).[34,35] Leader satisfaction (participation efficacy) will be measured using a modified version of the participation efficacy subscale of the VSI.[36] The original version of the VSI was validated using a sample of volunteers (N = 327) and was found to be reliable and constructually valid.[36] The participation efficacy subscale asks respondents to indicate their level of satisfaction on 7 items using a 7-point Likert scale from 1 (very dissatisfied) to 7 (very satisfied). Emotional distress will be assessed with the PHQ-8.[37,38] The PHQ-8 items measure depressive symptoms over the last 2 weeks on a 4-point scale, ranging from 0 (not at all) to 3 (nearly every day) with higher scores indicating more depressive symptoms. The PHQ-8 performs equivalently to the PHQ-9,[37] which is a valid measure of depressive symptoms in patients with SSc.[38] Participant Satisfaction with the SPIN-SSLED Program will be evaluated with the CSQ-8,[39,40] a standardized measure that is used to assess satisfaction with health services. Items are scored on a Likert scale from 1 (low satisfaction) to 4 (high satisfaction) with total scores ranging from 8 to 32. The CSQ-8 has been widely validated across a range of client populations.[39]

2.9 How will the outcome measures be measured at follow up? All outcome measures are self-report. At baseline, post-intervention, and 3 months post-intervention, SPIN-SSLED personnel will email participants with a link to a Qualtrics survey that includes outcome measures. If measures are not completed within a week, a reminder email will be sent, followed by a phone call from trial personnel 10 days from the original email. This is the same method that was used in the SPIN-SSLED Feasibility Trial.

2.10 What is the proposed sample size and what is the justification for the assumptions underlying the power calculations? We identified several meta-analyses that have evaluated self-efficacy in terms of knowledge acquisition and confidence in implementing skills acquired in training programs. A 2016 Cochrane review reported a standardized mean difference effect size of 0.87 for 4 educational interventions designed to change knowledge of sickle cell disease among patients and caregivers (standardized mean difference = 1.12 with an outlier study removed).[103] Several other meta-analyses have reported effect sizes of between 0.58 and 0.94.[104-107] In the SPIN-SSLED feasibility trial, which only included 10 participants, the pre-post change in self-efficacy for carrying out leadership tasks was 1.70.[31] For an assumed effect size of 0.70, a two-tailed test with $\alpha = 0.05$, and an intra-class correlation coefficient (ICC) of 0.05, N = 75 would provide ≥ 80% power for self-efficacy for carrying out leader tasks. There was no loss to follow-up in our feasibility trial. Assuming 20% loss to follow-up in the proposed trial, we would need to randomize 94 support group leaders. We believe that this is a

conservative power and sample size estimate. First, based on existing systematic reviews and on results of our feasibility trial, we believe that the true effect size is likely larger than 0.70. Second, in cluster RCTs, ICC values for individual patient outcomes are typically lower than our 0.05 estimate, even when different interveners are involved, and we will use the same trainer across groups in each language. If the true ICC is lower than our 0.05 estimate, this will result in greater power than estimated.[108-110] Third, there was no loss to follow-up in our feasibility trial, and in our previous completed studies in SSc that required follow-up, loss to follow-up has been 10% or less.[58,111]

For the secondary outcomes, burnout and emotional distress, based on published meta-analyses, a standardized mean difference effect size of 0.50 represents a clinically meaningful effect size for improvement that has been achieved in training programs for managers, caregivers of chronically ill patients, and parents of children with difficult behaviour.[112-115] This is also considered a clinically meaningful effect size for patient-reported health outcomes, including depressive symptoms.[116-118] For effect size = 0.50, a two-tailed test with $\alpha = 0.05$, and an ICC of 0.05, N = 146 would provide ≥ 80% power for both self-efficacy and patient-reported health outcomes. Assuming 20% loss to follow-up in the proposed trial, we would need to randomize 182 support group leaders.

Members of our Support Group Leader Advisory Team and our patient organization partners have emphasized the importance of evaluating the trial's planned secondary outcomes. Thus, we will attempt to enroll 180 participants total (15 training groups of 6 participants; 90 participants in waitlist control) in order to have sufficient power to adequately evaluate secondary outcomes.

2.11 Will health service research issues be addressed? Because SSc support group leaders, who are mostly people with SSc, have reported in interviews that leading support groups is burdensome and impacts quality of life, we will measure leader burnout with the OLBI, and emotional distress with the PHQ-8. We will not perform a formal economic evaluation, but we will collect detailed resource utilization data and report this descriptively.

2.12 What is the planned recruitment rate? How will the recruitment be organized? Over what time period will recruitment take place? What evidence is there that the planned recruitment rate is achievable? We will recruit 180 eligible leaders who are currently affiliated with our organizational partners (approximately 250, excluding co-leaders; 65%) or who are potential leaders not currently leading a group, which will add to the pool of eligible participants. Our patient organizational partners will contact potential participants. We will identify and recruit potential participants starting one to two months prior to initiation of training groups and will continue throughout the trial. We believe that this is feasible. To obtain 10 participants in the feasibility trial (see section 2.19), our partner organizations provided names of 12 possible participants from their lists, and all 12 agreed to participate (although one person withdrew prior to initiation for medical reasons, and we invited one of two from the waitlist to replace that participant).[31] There appears to be a high-level of enthusiasm in the international SSc community about the program. For instance, we have received 10-20 emails since we launched the feasibility trial from other leaders seeking to participate, even though the program was not advertised. Our patient organization partners will advertise the program to leaders, will emphasize their support, and will explain that the program will enable leaders to be certified, which our organizational partners plan to require for organizational affiliation.

2.13 Are there likely to be any problems with compliance? On what evidence are the compliance figures based? Of the 10 participants in the feasibility trial (see section 2.19), 2 participants missed 2 of 13 sessions (hospitalization, vacation), and 3 participants missed 1 session each. Overall, session

attendance was 95% (123 of 130 sessions). All 10 participants completed all baseline and post-trial measures.[31] Thus, we believe that compliance concerns will be minimal.

2.14 What is the likely rate of loss to follow up? On what evidence is the loss to follow-up rate based? We believe that the loss to follow-up will be low based on our feasibility trial results (no loss to follow-up) and previous studies in SSc. In a study of depression, for instance, where patients were recruited from multiple centers around Canada and completed burdensome telephone interviews, follow-up one-month post-baseline was completed by 309 of 345 participants (90%).[58,111] We have conservatively estimated a 20% loss to follow-up.

2.15 How many centers will be involved? We will recruit participants from lists provided by Scleroderma Canada and Canadian provincial organizations, including Sclérodermie Québec, the Scleroderma Foundation (United States), Scleroderma & Raynaud's UK, Scleroderma Australia and Australian state organizations, and Scleroderma New Zealand.

2.16 What is the proposed type of analyses? Analyses will be conducted by a statistician blind to trial arm allocation. For the primary outcome analysis (SSGLSS post-intervention), we will use an intent-to-treat analysis that compares all patients randomly allocated to the SPIN-SSLED Program to all patients allocated to the waitlist control. Intervention effect will be estimated using a generalized linear random effects model, adjusted for baseline SSGLSS scores. The model will include a random effect to account for clustering of participants in the training groups, but not for participants in the waitlist control arm.[89,91] We will investigate the effects of missing data using multiple imputation analysis. As a secondary analysis, we will examine SSGLSS scores post-intervention adjusted for baseline participant SSGLSS scores, age, sex, whether or not the leader has SSc, and new versus experienced leader status. Analysis of the SSGLSS at 3 months post-intervention will similarly be done with two analyses.

Analyses of leader burnout and emotional distress outcomes will only include experienced leaders because new leader would not yet experience burnout or emotional distress due to the burden of leading a group. Analyses of these outcomes will similarly be done (1) controlling for baseline scores only and (2) controlling for baseline scores, age, sex, whether or not the leader has SSc, and new versus experienced leader status.

Statistical significance for all analyses will be determined based on two-sided $\alpha = 0.05$.

2.17 What is the proposed frequency of analyses? The analyses described above will be performed once, at the end of the trial. No interim analyses are planned.

2.18 Are there any planned subgroup analyses? We will evaluate all outcomes after removing any participants who do not have SSc and, for the SSGLSS, after removing participants who are not current group leaders. We anticipate that well over 90% will have SSc and well over 90% will be current group leaders based on information from our organizational partners. In our feasibility trial, 9 of 10 participants were people with SSc and 10 of 10 were group leaders, including one who recently started.[31]

2.19 Has any pilot study been carried out using this design? We conducted a feasibility trial of the SPIN-SSLED Program (NCT03508661) that involved delivery of the SPIN-SSLED Program to two training groups of 5 participants each.[31] Scleroderma Canada and the Scleroderma Foundation each provided our team with names of 6 potential participants. All 12 agreed to participate in the program. We enrolled 10 initially, but one was hospitalized before the trial began; therefore, we thus added one participant who had been wait-listed.

Participant attendance was high (95%; 123 of 130 sessions). All 10 participants completed all baseline and post-trial measures, including an individual interview guided by the Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT). The interview questions addressed topics related to usability, understandability, organization and clarity of the SPIN-SSLED program. We produced user-friendly instructions for GoToMeeting, the online user-forum, and the SPIN data management platform. No sessions were missed or delayed due to technological difficulties, and time for technological support from our team was between 1-2 hours for the entire program.[31]

Pre-training, the mean (standard deviation [SD]) SSGLSS score, the primary outcome for the planned trial, was 124.4 (22.0), which was similar to the scores of our two international samples from the SSGLSS validation study (N = 102, mean [SD] SSGLSS = 122.9 [21.7]; N = 55, mean SSGLSS = 123.9 [19.4]). Post-training, the mean total score increased to 159.2 (17.1). The standardized mean difference effect size was 1.70, which is considered a large effect size. Items are scored on a 1-6 basis, and the average item score increase pre-post training was 1.1 points. For burnout (OLBI) and emotional distress (PHQ-8), the effect size of post-trial score improvement was between 0.38 and 0.45, which is considered a moderate effect size.[31]

Participant satisfaction was very high. Mean post-training score on the CSQ-8 was 30.6 (2.2). On a per item basis, the mean item score was 3.83 (item range 1-4). On the PEMAT interviews, there were relatively minor suggestions for improving the program, and feedback was extremely positive. The overall mean grade given by participants for the SPIN-SSLED Program was 9.4/10, and all 10 participants indicated they would recommend the program to other support group leaders.[31]

3. TRIAL

3.1 What are the arrangements for day to day management of the trial? E.g. randomization, data handling, confidentiality, storage and who will be responsible for coordination. The SPIN team, led by Dr. Thombs and located at the Jewish General Hospital, has the primary responsibility for study design and data analysis, maintaining the protocol and implementation of standard operating procedures, conducting recruitment and providing technical support to participants, overseeing trial progress, coordinating study logistics with organizational partners, preparing and distributing regular progress reports, and monitoring progress.

Outcome measures will be completed using the online surveying tool Qualtrics. Once the online survey data is collected, data will be exported to the statistics software program, IBM SPSS. Cleaning of the data will occur within SPSS by members of the study team. All information obtained about the participants during this study will be treated confidentially within the limits of the law. Only the researchers involved in this project will have access to the survey data. To protect the participants' privacy, upon inclusion in the SPIN-SSLED Trial, a unique participant identification number will automatically be assigned to each participant. An encrypted database will be created for the SPIN-SSLED Program, which includes the patient identification number. Only requests authorized by the principal investigator (Dr. Brett Thombs) will be granted access to this encrypted information. The survey is run through Qualtrics, a company whose computer servers are located in the USA. Data security measures in place at Qualtrics are described in the Qualtrics security statement (http://www.qualtrics.com/security-statement/). Information obtained from the survey and video recordings of the training sessions used to evaluate fidelity to program will be kept for 10 years on encrypted hard drives by the researchers responsible for this study. Access to the data will be limited to the investigators of the study at the Jewish General Hospital.

3.2 What will be the role of each investigator and co-investigator? As principal investigator, Dr. Thombs will oversee trial conduct, data analysis, and knowledge translation activities, and coordinate collaboration between the research team and partners. Dr. Thombs is the Founder and Director of SPIN, which has a long history of successful collaboration with our partners. His expertise in clinical trials and pragmatic trial designs is reflected in his leadership of an international team that has been funded by CIHR to develop a CONSORT extension for trials conducted in cohorts and existing data sources.[119,120] **Ms. Maureen Sauvé (Knowledge User)** has SSc, is Past-President of Scleroderma Canada and the Scleroderma Society of Ontario, and leads the patient support work of these organizations. **Ms. Kerri Connolly (Knowledge User)** is Programs and Services Director for the Scleroderma Foundation and responsible for the foundation's patient support programs. **Dr. Linda Kwakkenbos**, Assistant Professor, Radboud University, is Co-director of SPIN and will work with Dr. Thombs on day-to-day trial management. **Dr. Linda Horwood** is a SPIN Postdoctoral Fellow who will work with Dr. Thombs and Dr. Kwakkenbos as coordinator of the trial. **Dr. Robert Platt** is a biostatistician, Professor, and Albert Boehringer I Chair in Pharmacoepidemiology, McGill University. He has extensive experience in the design and analyses of of RCTs, including cluster trials. He designed and will conduct trial analyses. **Dr. Vanessa Malcarne** is Professor of Psychology, San Diego State University. She has researched psychosocial adjustment and support mechanisms in SSc for over 20 years. **Dr. Ghassan El-Baalbaki** is Associate Professor of Psychology, Université du Québec à Montréal. He has expertise in peer support in chronic diseases, including SSc, and in training support group leaders. **Dr. Sandra Peláez** is an investigator with the Lady Davis Institute for Medical Research, Jewish General Hospital. She studies coping and social support in chronic diseases, including SSc. Drs. Malcarne, El-Baalbaki, and Peláez will oversee training groups and monitor training program delivery fidelity. **Dr. Marie Hudson** is a rheumatologist and Associate Professor, McGill University, who is expert in SSc. She contributed to design of educational materials, and who will oversee their use in the training program. The **SPIN-SSLED Support Group Leader Advisory Team** consists of SSc patient support group leaders from Canada (Ms. Catherine Fortune, Ms. Geneviève Guillot, Ms. Michelle Richard, Mr. Ken Rozee, Ms. Maureen Sauvé) and the United States (Mr. Stephen Elrod, Ms. Jacqueline Gerena, Ms. Amy Gietzen, Ms. Karen Gottesman, Ms. Nancy Stephens, Ms. Laura Dyas). Members of the Advisory Team were involved in preliminary research and intervention development and preliminary testing and will be involved in patient outreach and collaboration.

3.3 Describe the trial steering committee and if relevant the data safety and monitoring committee. The trial will be overseen by the SPIN Steering Committee (https://www.spinsclero.com/en/Team?teamID=0d6dd6a6-8bee-62ed-b515-ff0000ce1efe) along with the trial investigators. The Steering Committee will provide scientific direction for the RCT and will meet periodically to assess its progress. It will be responsible for RCT protocol execution, routine monitoring of data quality, and will meet semi-annually to discuss recruitment and retention and to assess that the trial is meeting key milestones consistent with the timeline.

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