



Supporting Emotional Recovery After Spontaneous Coronary Artery Dissection: Development and Pilot Testing an Online Facilitated Support-Group Program

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Accepted: 19 March 2025

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Abstract

Spontaneous coronary artery dissection (SCAD) is a major medical event with a high burden of psychosocial sequelae. SCAD survivors require psychological support to facilitate recovery. This pilot study involved feasibility testing of an online group support program for SCAD survivors, co-designed by clinicians, survivors and researchers. The *SCAD Online Support Program* uses the principles of Acceptance and Commitment Therapy. The four-session-manualized program, facilitated by a registered psychologist and a SCAD survivor, was delivered to 33 SCAD survivors (6–7 per group). Participant and Project Advisory Group feedback led to iterative program refinements. Qualitative and quantitative acceptability data were evaluated. Participants completed pre- and post-program questionnaires to assess engaged living (life fulfilment and valued living), enrichment, self-efficacy, anxiety, depression and cardiac distress. Changes in proportions classified as anxious, depressed and distressed were identified. Qualitative comments highlighted the support, camaraderie and skills gained through the program. There were improvements in levels of life fulfilment, valued living, enrichment, self-efficacy, anxiety, depression, and cardiac distress, and reductions in proportions classified as anxious, depressed and distressed. The *SCAD Online Support Program* was successfully co-designed, implemented and modified, shown to be acceptable to SCAD survivors, and demonstrates potential for improving mental health outcomes.

Keywords Spontaneous coronary artery dissection · SCAD · Support group · Pilot study · Online · Acceptance and commitment therapy · ACT

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Introduction

Spontaneous coronary artery dissection (SCAD) is an increasingly recognized cause of myocardial infarction (MI) with significant emotional and mental health consequences. Anxiety and depression (Murphy et al., 2023, 2024; Neu-beck et al., 2022; Saw et al., 2016; Wagers et al., 2018), as well as post-traumatic stress disorder (Edwards et al., 2019; Sumner et al., 2024), are prevalent in SCAD survivors. Pre-dominantly affecting women (approximately 90% of SCAD cases), often younger and with few traditional cardiac risk factors (Franke et al., 2021; Hayes et al., 2020), SCAD generally occurs without warning. Common emotional experiences after SCAD include shock, confusion and uncertainty, loss of control and threats to autonomy, fear of recurrence including concerns about triggering another SCAD, and hypervigilance about symptoms (Clark et al., 2021; Murphy

et al., 2022, 2024; Saw et al., 2016). Given that emotional stress can trigger SCAD recurrence (Smaardijk et al., 2021; Wagers et al., 2018), management of stress and emotional wellbeing is a high priority for SCAD survivors.

Compared with their non-SCAD MI counterparts, SCAD survivors are typically younger and relatively healthy, but face greater uncertainty, isolation and fear of recurrence (Murphy et al., 2022, 2024; Neubeck et al., 2022; Turner et al., 2023; Wagers et al., 2018). SCAD survivors require a tailored approach to management that provides both psychological and peer support (Binnie et al., 2023; Bouchard et al., 2021; Chou et al., 2016; Clark et al., 2021; Murphy et al., 2022; Neubeck et al., 2022; Turner et al., 2023; Wagers et al., 2018). Cardiac rehabilitation (CR) programs, the gold standard care for recovery after MI and other heart-related events, are typically not tailored to suit the needs of SCAD survivors (Binnie et al., 2023; Bouchard et al., 2021; Neubeck et al., 2022). Specifically, there are questions regarding the safety of exercise and the relevance of lifestyle change education after SCAD (Chacin-Suarez et al., 2021; Clark et al., 2021; Samuel et al., 2021; Wagers et al., 2018). Consistently, SCAD survivors themselves report that typical CR programs are insufficiently tailored to their psychosocial and educational needs and leave them feeling unsupported and isolated (Binnie et al., 2023; Bouchard et al., 2021; Clark et al., 2021; Edwards et al., 2019; Murphy et al., 2025; Neubeck et al., 2022; Turner et al., 2023; Wagers et al., 2018).

Further, as SCAD is a relatively rare condition, opportunities to connect with other SCAD survivors in face-to-face programs are limited (Bouchard et al., 2021). Qualitative studies reveal that SCAD survivors want opportunities to connect with other SCAD survivors, to express their fears and concerns, and feel validated and emotionally supported in their recovery (Binnie et al., 2023; Murphy et al., 2022; Wagers et al., 2018). By enhancing reach, online delivery enables connection between survivors, particularly relevant as SCAD survivors tend to be geographically isolated due to the low prevalence nature of the condition (Binnie et al., 2023; Murphy et al., 2022; Vaca et al., 2021). Gender-specific groups have also been suggested (Bouchard et al., 2021). Group facilitation by a skilled health professional ensures that participants are provided with effective and positive support (Bouchard et al., 2021; Murphy et al., 2022; Postelnik et al., 2021; Turner et al., 2023), while co-facilitation involving a person with lived experience has numerous positive impacts (Binnie et al., 2023; Bouchard et al., 2021; Murphy et al., 2022; Postelnik et al., 2021; Vaca et al., 2021).

Despite the identified need, there are few reports of the development and implementation of targeted psychosocial support programs for SCAD survivors. A recent pilot study of a cognitive behaviour therapy (CBT) based group program showed promising results in reducing anxiety and depression

after SCAD (Vaca et al., 2021). As a descendant or third wave of CBT and based on the theoretical framework of relational frame theory, Acceptance and Commitment Therapy (ACT) is one of a number of new mindfulness-oriented cognitive and behavioural therapies (Hayes, 2004). ACT has been shown to improve quality of life (Zhang et al., 2023), self-management ability (Cao et al., 2022; Rashidi et al., 2021; Zhang et al., 2023), psychological resilience (Cao et al., 2022), stress (Rashidi et al., 2021), and depression and anxiety (Zhang et al., 2023) in various cardiac populations. However, to our knowledge, ACT has not been used with SCAD survivors.

ACT presents as a suitable model for post-SCAD support. Focusing on the idea that suffering comes not from the experience of emotional pain but, rather, from attempts to avoid pain, ACT encourages acceptance of current experiences and emotions (Hayes, 2004). ACT aims to help people create meaning in their lives and increase psychological flexibility by promoting connection to the present moment, identifying and committing to values-based action, separating cognitions and behaviours, and making decisions about the things in life over which one has control (Hayes et al., 2012). For SCAD survivors who face high uncertainty, loss of control, and threats to identity and autonomy (Bouchard et al., 2021; Murphy et al., 2022, 2024), ACT has the potential to support them in coming to terms with the event and adjusting to the challenges and changes presented.

The present study involved the development and pilot testing of a facilitated online ACT-based psychosocial group program for SCAD survivors. The program was co-designed by clinicians, survivors and researchers, with content informed by focus groups with recent SCAD survivors (Murphy et al., 2022) and overseen by a Project Advisory Group (PAG) comprising people with lived experience of SCAD and representatives of collaborating organizations.

Aims

The aims of this study were to (i) develop and pilot-test a co-designed, co-delivered online facilitated support-group program for SCAD survivors; (ii) assess participant program engagement and acceptability; (iii) assess changes in pre/post-program ACT-program impacts (engaged living, enrichment and self-efficacy in the application of ACT components) and clinical outcomes (anxiety, depression, and cardiac distress) and (iv) investigate pre/post-program changes in the proportions of participants classified as anxious, depressed and distressed.

Method

Governance

The study conformed to the principles outlined in the Declaration of Helsinki and was approved by the Human Research Ethics Committee (HREC) of St Vincent's Hospital Sydney (2019/ETH03171; 5 October 2021). A PAG comprising four SCAD survivors, together with representatives from SCAD Research Inc. Australia, the Victor Change Cardiac Research Institute (VCCRI), and the Australian Centre for Heart Health (ACHH) was convened to oversee the project. The PAG met online at project commencement, and a further four times over the project duration. PAG members provided feedback on all program aspects including the overall structure and format, the 'ACT for SCAD' model, the facilitation manual, and the participant workbook.

Study Design

As a pilot study, all participants were assigned to the support program. Participants completed an online questionnaire at two timepoints: baseline (in the week prior

to program commencement) and follow-up (2 weeks post-program).

Participant Recruitment

Recruitment occurred between February and August 2023 through the VCCRI database of participants involved in a larger genetic study (Tarr et al., 2022). All individuals on the database had a confirmed history of SCAD. Eligible participants were contacted by the VCCRI study co-ordinator (SH) via telephone, screened for eligibility and invited to participate. Recruitment occurred until all groups had reached full capacity. Thirty-seven participants consented; however, one withdrew prior to program commencement due to work commitments, while three were unavailable for the given dates. All participants had experienced at least one episode of SCAD in the past 3 years, were aged over 18 years, had access to a computer and the internet, had adequate understanding of written and spoken English, and had given informed written consent to participate.

Development of the SCAD Online Support Program

The *SCAD Online Support Program* is a manualized program based on the principles of ACT. Figure 1 shows the 'ACT for SCAD' intervention program schedule and model that underpins the program. The 'ACT for SCAD' model is

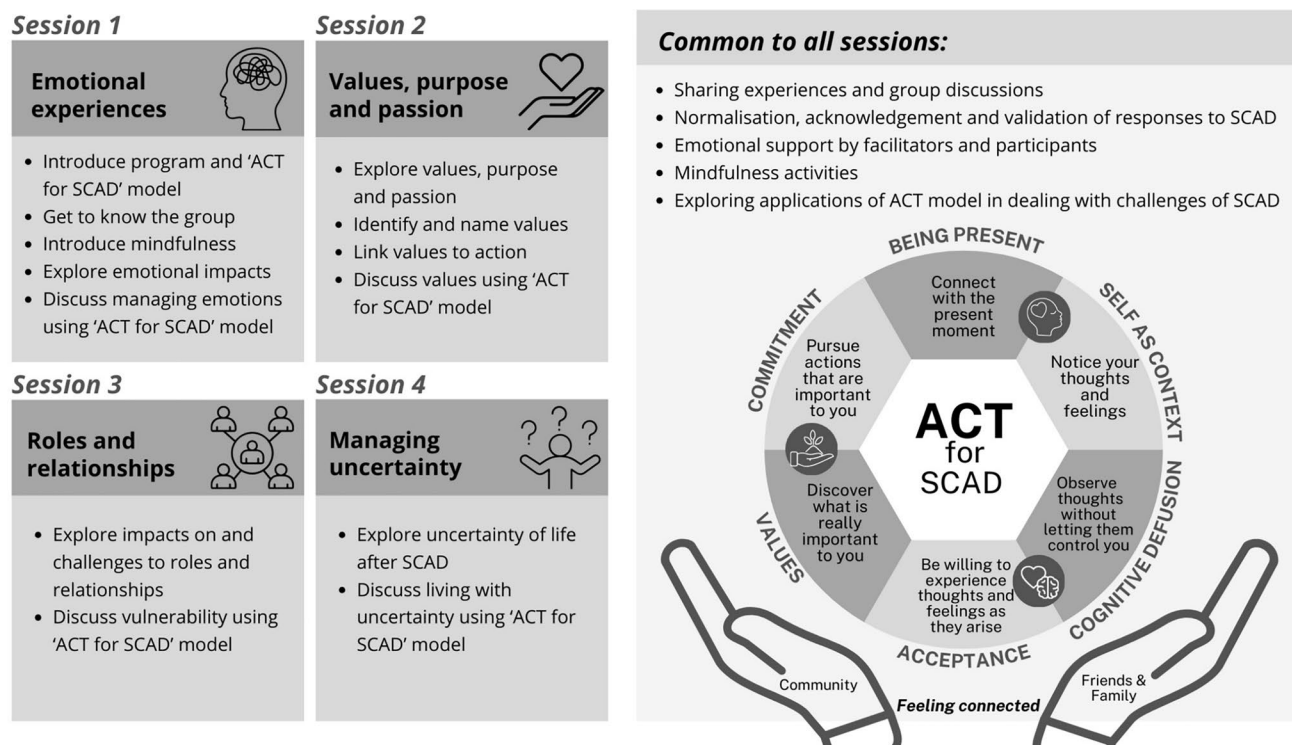


Fig. 1 'ACT for SCAD' intervention program schedule and model

based on the original ACT Hexaflex developed by Hayes and colleagues (Hayes et al., 2012), with re-wording in consultation with the PAG to ensure that it would be understood by and relevant to SCAD survivors. This model was used during all sessions of the program to help explore the topic issues and demonstrate the ACT strategies and guide discussions.

The aim of the program is to build participants' capacity for mindful reflection, increase psychological flexibility and build coping strategies for improving life through acceptance and growth. Attention was given to providing opportunities for participants to share stories, provide acknowledgement and validation to each other and explore how they could apply the learnings from the ACT model to deal with the challenges inherent in SCAD. The program comprised four sessions as shown in Fig. 1. A written facilitators' manual was used to guide the program, with a corresponding participant manual to assist participants to record their learnings and progress.

Program Delivery

The program was delivered online in the early evening of a nominated weekday for four 90 min weekly sessions. The program was facilitated by a registered health psychologist (RH), with co-facilitation by a SCAD survivor (JB/AW). Five 4-week programs were delivered sequentially between March and September 2023 (three female-only programs for first-time SCAD survivors [$n=7$, 6 and 7]; one for females who had experienced more than one SCAD event ($n=7$); one male-only program ($n=6$); total of 33 participants). Our earlier focus group work, and that of others (Binnie et al., 2023; Bouchard et al., 2021; Murphy et al., 2022; Turner et al., 2023), highlighted that males feel particularly isolated due to the rarity of SCAD in men, and have specific needs post-SCAD given the gender-specific SCAD triggers, roles and relationships. Qualitative studies also show that SCAD recurrence exacerbates anxiety and self-management concerns, highlighting specific needs for survivors of repeat SCAD (Binnie et al., 2023; Bouchard et al., 2021; Murphy et al., 2022; Turner et al., 2023). The PAG also endorsed the choice of separate male-only and repeat SCAD groups.

To increase rapport among group members and due to the sensitive nature of the discussions, the programs were delivered as closed groups (i.e. all participants in each program starting and ending the program at the same time). A 2-week gap between each sequential program was used for the team to reflect on and refine the program, based on feedback from participants, insights from program facilitators, and input from the PAG. Between sessions within each program, the lived-experience co-facilitators were given opportunities to de-brief with the facilitator and/or project investigators as required, to assist them in their roles and support their

wellbeing. Co-facilitators were directed to self-disclose solely for the purpose of validating and supporting program participants. Participants were asked not to share contact details among each other until their program concluded, so as not to impact the group process.

Measures

Participant Characteristics

Demographic information included sex, age and country of birth. Socioeconomic status indicators included geographic location, education level, employment status, private health insurance status and financial strain (measured using a 5-point scale from none to severe). Social support indicators included partner status, living arrangements (alone vs. with others) and presence of a close confidante. Participants also reported whether they knew another SCAD survivor before the support-group program. Psychological indicators included self-reported history of anxiety, depression and distress. Self-reported medical information included time since most recent SCAD, number of SCADs, traditional cardiac risk factors, SCAD comorbidities, other concurrent conditions and CR program attendance.

Program Engagement and Acceptability

The number of sessions attended was recorded. Program acceptability was assessed at program conclusion using a nine-item scale to assess acceptability of program content, format and delivery. Participants were asked to provide open-ended comments on their program experiences.

ACT-Program Impacts

Engaged Living Engaged living was measured using the Engaged Living Scale (ELS) (Trompetter et al., 2013). The ELS measures an engaged response style (i.e. the *process* of engaged living) from the framework of ACT and focusses on identifying and living according to one's life values. The ELS contains two subscales: valued living (VL; 10 items) and life fulfilment (LF; 6 items). The ELS has been shown to have strong psychometric properties for measuring ACT-defined concepts in clinical populations but has not been validated in cardiac populations (Barrett et al., 2019).

Enrichment The enrichment subscale of the Illness Identity Questionnaire (IIQ) (Oris et al., 2018) contains 7 items to measure personal growth and self-awareness, strength and resilience, and enjoying the moment. The IIQ is reliable and has been validated in cardiac patients (Van Bulck et al., 2021). The enrichment subscale was chosen due to its relevance to the ACT components.

Self-efficacy Self-efficacy was assessed using a 5-item scale designed specifically for this study to evaluate participants' confidence regarding each of the ACT components addressed in the program, namely, recognizing and naming their values, behaving in line with their values, being in touch with the present moment, distancing themselves from their thoughts and tolerating their feelings as they arise. Each item was rated on a 5-point Likert scale. A total score (range = 5–25) was calculated by summing responses, with higher scores indicating higher self-efficacy.

Clinical Outcomes

Anxiety Anxiety was assessed using the 7-item Generalized Anxiety Disorder instrument (GAD7) (Spitzer et al., 2006). Participants scoring ≥ 10 were classified as anxious (Spitzer et al., 2006). The GAD7 has good reliability and validity for detecting generalized anxiety and has been validated in cardiac populations (Conway et al., 2016).

Depression Depression was assessed using the 9-item Patient Health Questionnaire (PHQ9) (Kroenke et al., 2001). Participants scoring ≥ 10 were classified as depressed (Kroenke et al., 2001). The PHQ9 has been validated with cardiac patients (Stafford et al., 2007).

Cardiac Distress Cardiac distress was measured using the 12-item Cardiac Distress Inventory—Short Form (CDI-SF) (Le Grande et al., 2023). For each item, participants indicated if they had experienced distress in the past 4 weeks. For endorsed items, participants then reported the level of distress they perceived with the issue, using a four-point response scale. Example items include 'thinking I will never be the same again' and 'being emotionally exhausted'. The CDI-SF cut-off score of ≥ 13 indicates likelihood of clinical cardiac distress (Le Grande et al., 2023). The CDI-SF has been validated in cardiac populations (Le Grande et al., 2023) and used in a SCAD population (Murphy et al., 2023).

Data analysis

Frequencies and percentages were calculated for participant characteristics, program attendance and acceptability items and clinical categories of the GAD7, PHQ9 and CDI-SF. Means and standard deviations were reported for the ACT-program impact and clinical outcome measures. All statistical analyses were conducted using SPSS (Version 27.0. Armonk, NY: IBM Corp). Qualitative comments regarding program acceptability and experiences were analysed thematically using the recommendations of Braun and Clarke (2006). Specifically, two investigators (MR and BM) independently read participant comments to identify themes regarding program acceptability and experiences. Using

an iterative process, themes were then discussed, reflected on and refined by three investigators (MR, BM and AJ) to achieve consensus. All analysts had extensive experience in conducting qualitative research.

Results

Participant Characteristics

Of the 33 SCAD participants, ages ranged from 39 to 68 years, with a mean (SD) age of 53.67 (7.17). Apart from one person who had experienced their SCAD 37 months previously, the time since SCAD ranged from 1 to 23 months, with a mean (SD) of 8.6 months (6.5 months). Participant demographic, psychosocial and medical characteristics are shown in Table 1.

Modifications to Program Content Based on Participant, PAG and Facilitator Feedback

Changes made to the program content included slight rewording of the participant manual to improve readability and brevity, updating the *ACT for SCAD* model to highlight the importance of feeling connected with friends, family and community, and allowing more time and opportunities for sharing and hearing participant stories. A small number of participants commented that they found the mindfulness activities challenging. This issue was discussed with the PAG and program facilitators, resulting in suggested amendments to improve the experience of the mindfulness activities. This included improving the preamble to the mindfulness activities; reducing their number and length; and providing recordings for participants to practice between sessions.

Program Engagement and Acceptability

Session Attendance

The number of online sessions attended ranged from one to four, with a mean (SD) of 3.48 (0.80). Twenty-one participants (64%) attended all four sessions, eight (24%) attended three, three (9%) attended two, and one (3%) attended one session.

Program Ratings

Almost all participants rated the program as highly acceptable (Table 2). Ratings demonstrate that the program was considered enjoyable, safe, supportive and well facilitated; provided self-management strategies and should be made more widely available. While 21 participants (64%) noted

Table 1 Characteristics of program participants ($N=33$)

	<i>n</i>	%
Demographic characteristics		
Sex		
Female	27	81.8
Male	6	18.2
Age group		
50 or younger	8	24.2
51–60	17	51.5
Over 60 years	8	24.2
Country of birth		
Australia	27	81.8
Outside Australia	6	18.2
Socio-economic indicators		
Geographic location (MMM)		
Metropolitan	25	75.8
Regional	3	9.1
Rural	5	15.1
Education level		
Secondary	3	9.1
Trade/certificate	7	21.2
University degree/post-graduate	23	69.7
Employment status		
Employed	29	87.9
Not in paid workforce	4	12.1
Insurance status		
Have health insurance	25	75.8
No health insurance	8	24.2
Financial strain		
No	26	78.8
Yes	7	21.2
Social support indicators		
Partner status		
Married/partnered	23	69.7
Divorced/separated	8	24.2
Never married	2	6.1
Living alone	5	15.2
No close confidante	2	6.1
Knows another SCAD survivor (before program)	10	30.3
Psychological characteristics		
Current anxiety ($GAD7 \geq 10$) ^a	6	18.2
Current depression ($PHQ9 \geq 10$) ^a	6	18.2
Current cardiac distress ($CDI-SF \geq 13$) ^b	9	27.3
Mental health history prior to SCAD	9	27.3
Medical characteristics ^c		
Time since last SCAD		
1–6 months	16	48.5
7–12 months	8	24.2
More than 12 months	9	27.3
Total number SCADs		
One	24	72.7
Two	5	15.2

Table 1 (continued)

	<i>n</i>	%
Three	2	6.1
Four	2	6.1
Traditional cardiac risk factors		
High blood pressure	9	27.3
Obesity	5	15.2
High cholesterol	3	9.1
Diabetes	0	0
Cigarette smoking (current)	1	3.0
SCAD comorbidities		
Migraine	13	39.4
Fibromuscular dysplasia	6	18.2
Connective tissue disorder	2	6.1
Concurrent conditions		
Musculoskeletal condition	7	21.2
Inflammatory disorder	3	9.1
Sleep apnoea	4	12.1
Attended cardiac rehabilitation program ^d	22	66.7

$N=33$. ^ain past 2 weeks; ^bin past 4 weeks; ^cmedical characteristics assessed via self-report; ^dsince most recent SCAD. *MMM* Modified Monash Model. Financial strain: yes=reports of moderate, considerable or extreme financial strain; no=reports of no or minimal financial strain. Current anxiety=scores ≥ 10 on the Generalized Anxiety Disorder 7-item (GAD7). Current depression=scores ≥ 10 on the Patient Health Questionnaire 9-item (PHQ9). Current distress=scores ≥ 13 on the Cardiac distress inventory-short form (CDI-SF). Mental health history=reports of anxiety, depression or post-traumatic stress disorder prior to SCAD. *SCAD* spontaneous coronary artery dissection. All characteristics based on self-report

that four was the right number of sessions, 12 (36%) indicated that four was too few.

Qualitative Feedback

Participant qualitative feedback revealed eight key themes: three themes related to program components; three to program logistics and two to overall program endorsement. Specific quotes for themes are presented in Table 3.

In terms of program components, participants particularly valued the benefits gained through understanding and accepting their emotions (*Engagement with ACT*), the support gained through sharing with and being validated by other SCAD survivors (*Group interaction*), and the skills and inclusiveness of the two facilitators (*Group facilitation*).

In terms of program logistics, participants commonly wanted the program to include more sessions, in particular a follow-up/booster session (*Program length*) and to be available early after the SCAD (*Program timing*). They appreciated the single-sex group composition and group size (*Group composition*).

Table 2 Ratings of program acceptability (N=33)

	Strongly agree <i>n</i> (%)	Agree <i>n</i> (%)	Neither <i>n</i> (%)	Disagree <i>n</i> (%)	Strongly disagree <i>n</i> (%)
I enjoyed being part of a group and engaging in group activities	17 (52)	13 (39)	2 (6)	1 (3)	0
I felt safe to share my experiences with the group	15 (45)	16 (49)	2 (6)	0	0
I felt supported in the group setting	16 (49)	14 (42)	3 (9)	0	0
I liked that the group was facilitated by a health professional	20 (61)	11 (33)	2 (6)	0	0
I liked that the co-facilitator was a SCAD survivor	21 (64)	11 (33)	1 (3)	0	0
The program gave me strategies to help me manage my emotions	8 (24)	24 (73)	1 (3)	0	0
The program should be available to more SCAD survivors	23 (70)	9 (27)	1 (3)	0	0

In terms of program endorsement, participants commonly expressed gratitude and appreciation for being involved (*Gratitude about involvement*) and highlighted the importance of the program being available to more SCAD survivors (*Program dissemination*).

Change Over Time in Program Impacts and Clinical Outcomes

ACT-Program Impacts

Measures of ACT-program impacts, including engaged living (valued living and life fulfilment), enrichment and self-efficacy associated with the ACT components, all demonstrated improved scores from pre- to post-program (Table 4).

Clinical Outcomes

There were improvements from pre- to post-program in scores on the GAD7 (anxiety), PHQ9 (depression) and CDI-SF (cardiac distress) (Table 4). From pre- to post-program, there were reductions in the proportions of participants classified as anxious, depressed and distressed.

Discussion

The present study demonstrated that the *SCAD Online Support Program*, a co-designed, psychosocial intervention, can be successfully implemented with and is acceptable to SCAD survivors. Participants viewed the program positively, learned ACT-related skills, such as identifying and managing emotions, and felt supported and validated by the facilitators and fellow participants. Following the 4-week program, scores on anxiety, depression and cardiac distress measures decreased, while engaged living, enrichment and self-efficacy scores increased. At program completion, fewer participants were classified as anxious, depressed and distressed.

The ACT model appears to be highly relevant for SCAD survivors. Participants gained enhanced confidence, life fulfilment and enrichment, with improvements in self-awareness, resilience and ability to live in the moment. These qualities are particularly relevant for SCAD survivors given the uncertainty, threats to identity and autonomy, and self-management challenges they experience (Bouchard et al., 2021; Murphy et al., 2022, 2024). Both engaged living and enrichment have been shown to be related to positive psychological functioning (Navarrete et al., 2023; Oris et al., 2018), lending support to the use of ACT after SCAD.

The group aspect of the program appeared to be particularly helpful. Participants consistently commented on the support they received from one another and the group facilitators. Importantly, most participants did not know another SCAD survivor prior to their program involvement: the opportunity to express their own and hear others' experiences of the SCAD recovery process and be emotionally supported and validated by those in a similar situation was considered invaluable. Other studies have similarly reported on the benefits of support groups for people with rare conditions (Sanders et al., 2024; Vaca et al., 2021). The power of group support after SCAD cannot be underestimated, given that SCAD survivors commonly experience isolation, invalidation and uncertainty (Murphy et al., 2022).

Given the high psychosocial burden and prevalence of anxiety and depression among SCAD survivors (Murphy et al., 2023, 2024), the present results are promising. Many participants showed resolution of pre-program anxiety, depression and distress. A previous pilot study demonstrated similar improvements in psychological distress, particularly anxiety, following a CBT-based SCAD group program (Vaca et al., 2021). While some participants felt that the program would be most valuable in early recovery, studies have shown that recent SCAD survivors gain insight and support from group members further along the recovery trajectory, who provide 'a light at the end of the tunnel' (Murphy et al., 2022; Vaca et al., 2021).

Table 3 Qualitative quotes for all themes

Theme	Examples of participants' responses
1. Program components	
a) Engagement with ACT	<i>"The program enabled me to recognise the many emotions I had experienced pre and post SCAD and gave me the tools to address them"</i> <i>"Opportunity to talk through and identify emotions and identify strategies to work through them"</i> <i>"An understanding of the mental and emotional impact that we all had following our SCAD and the 24-h concern that it may happen again. Great to have understanding that I could do something about the negative emotions I had following SCAD"</i> <i>"I like the ACT diagram as an ongoing tool"</i>
b) Group interaction	<i>"The SCAD survivors I met were nothing less than inspirational and it was so great to connect"</i> <i>"I really liked how supportive and caring everyone was. It felt like a safe space to talk openly and honestly"</i> <i>"I liked how everyone was engaged with each other, their stories and their feelings"</i> <i>"The encouragement to tell your stories and opportunity to hear others' stories and experiences"</i> <i>"The feeling of being less alone on the journey as a SCAD survivor"</i> <i>"The opportunities to hear the stories of other SCAD survivors, firsthand particularly for those who experienced multiple SCAD events. And to affirm each other in our shared emotions and experiences"</i> <i>"This program is so beneficial to enable SCAD survivors to discuss, share and listen to fellow survivors' experiences, fears and expectations"</i> <i>"I was welcomed to be me"</i>
c) Group facilitation	<i>"Great that it was facilitated by a health professional and fellow SCAD person"</i> <i>"I can't speak highly enough of [facilitator] who always knows what to say and in such a nice way too. And [co-facilitator] was excellent in sharing her experiences and thoughts"</i> <i>"The facilitator and co-facilitator were so warm and inclusive"</i> <i>"It was great to have [co-facilitator] in the group who has been through all we've been through for a longer time"</i>
2. Program logistics	
a) Program length	<i>"Everyone warmed up more as the sessions progressed and I felt we were really starting to all engage with each other and it was over"</i> <i>"I would have liked for it to go longer"</i> <i>"Our group felt like it had just warmed up and settled in at Session 4. I think it could be 5–6 weeks program"</i> <i>"It would be nice to see a follow up in the future with the same attendees"</i> <i>"Might you consider a single follow up session in 6 months, just so we can check in with each other?"</i>
b) Program timing	<i>"It would have been great for me earlier in my SCAD recovery. At 18 months out I have already sought help for the mental/emotional problems I experienced"</i> <i>"I would strongly recommend SCAD survivors have an opportunity to be part of such a program as soon as possible after their SCAD to get maximum benefit. I was way more emotional and vulnerable in the first 6–9 months, and ideally that's when I would have benefited most from some support"</i> <i>"I would have found this extremely beneficial in the first few months after my SCAD"</i>
c) Group composition	<i>"The program recognised that men communicate and bond best when in a small group with a common subject or interest"</i> <i>"I liked being able to interact with other male SCAD patients"</i> <i>"I did like that it was only other women in the group"</i> <i>"Being able to share with other women the story of pre- and post-SCAD"</i> <i>"The group size was spot on"</i>
3. Program endorsement	
a) Gratitude about involvement	<i>"I am extremely grateful to have been offered to join the support group"</i> <i>"I do appreciate having been included, and value the amazing work being done on SCAD"</i> <i>"The program was very good and I am grateful to have taken part"</i> <i>"I found the support program to be a big help to me and appreciate the care and support"</i> <i>"The program gave me great comfort in knowing that there are resources being provided towards the cause"</i>
b) Wider dissemination	<i>"I think this program should be available to all SCAD patients"</i> <i>"This is a great support group that many SCAD survivors would benefit from"</i> <i>"Much needed and needs to be available more widely"</i>

A strength of the current program was its co-design, with involvement of SCAD survivors throughout the process. This included focus groups informing program design and development (Murphy et al., 2022); co-facilitation by

a SCAD survivor; input from the PAG assisting with program refinement and delivery and participant and co-facilitator feedback and reflections. This successful co-design and co-implementation are an important consideration in

Table 4 Changes in program impact scores for self-efficacy, engaged living (valued living and life fulfilment) and enrichment, and clinical outcome scores, including proportion of respondents' classification of anxiety, depression and cardiac distress from pre- to post-program

	Baseline N=33		Follow-up N=33	
	M	SD	M	SD
ACT-program impacts				
Valued living	38.58	5.40	39.72	6.40
Life fulfilment	19.15	5.55	20.59	4.11
Enrichment	22.27	5.13	24.19	6.20
Self-efficacy	18.27	3.47	19.19	2.42
Clinical outcomes				
Anxiety	4.94	4.29	3.67	3.80
Not anxious (n,%)	16	48	21	64
Mild anxiety (n,%)	11	33	11	33
Moderate anxiety (n,%)	5	15	0	0
Severe anxiety (n,%)	1	3	1	3
Depression	5.85	5.53	4.45	4.30
Not depressed (n,%)	16	48	20	61
Mild depression (n,%)	11	33	11	33
Moderate depression (n,%)	4	12	1	3
Severe depression (n,%)	2	6	1	3
Cardiac distress	8.61	7.76	6.36	6.33
Not distressed (n,%)	24	73	28	85
Distressed (n,%)	9	27	5	15

Valued living and Life fulfilment are subscales of the Engaged Living Scale. Enrichment measured by the enrichment scale of the Illness Identity Questionnaire. Self-efficacy measured by 5-item measure. Anxiety measured using the Generalized Anxiety Disorder 7-item (GAD7); scores <5 'no anxiety', 5–9 'mild', 10–14 'moderate', ≥15 'severe'. Depression measured using the Patient Health Questionnaire (PHQ9); scores <5 'no depression', 5–9 'mild', 10–14 'moderate', ≥15 'severe'. Cardiac distress measured using the Cardiac Distress Inventory—Short Form (CDI-SF); scoring ≥13 indicating distress

future program delivery, ensuring its acceptability and relevance to future SCAD survivors.

An innovative co-design feature was co-facilitation by a professional and a survivor, which participants highly valued. The importance of these two complementary roles was informed by our previous focus group study (Murphy et al., 2022). Heath professional facilitation ensures a safe and moderated group environment, while lived-experience co-facilitation helps build connection and inspires hope (Postelnik et al., 2021; Vaca et al., 2021). Importantly, this study confirmed the importance of providing adequate training and appropriate debriefing opportunities for lived-experience co-facilitators to ensure they could effectively perform the role and safely 're-live' their own experiences (Bouchard et al., 2021; Postelnik et al., 2021).

Limitations

The current study has some limitations. First, being a pilot study with a small sample size and no control group, it is not possible to conclude that demonstrated improvements in clinical outcomes were attributable to the intervention alone. Second, the sample may not be representative of the broader SCAD population: participants were relatively well educated, which may have biased the sample towards those with better health outcomes (Raghupathi & Raghupathi, 2020). Third, with only a single follow-up, evidence of the longer-term program benefits is unknown. Future studies including a larger sample, randomization to treatment and control groups, and later outcome assessments are warranted. Fourth, our study did not assess PTSD, which is highly relevant for SCAD survivors (Edwards et al., 2019; Sumner et al., 2024). Finally, medical information and outcome variables were measured by self-report, albeit using well-validated tools.

Implications and Conclusion

Despite a recent increase in SCAD-related research, psychosocial interventions for SCAD survivors remain sparse. This pilot study presents an innovative, co-designed psychosocial group program for SCAD survivors, which is highly scalable with the potential for national and international reach. The online platform ensures accessibility to SCAD survivors across broad geographic locations. This is essential for SCAD survivors, who are typically geographically and personally isolated. The addition of a booster session is likely to enhance program outcomes.

The *SCAD Online Support Program* has the potential to complement traditional CR programs which focus on education and physical re-conditioning, by addressing the currently unmet psychosocial support needs of this largely under-supported population. The program also complements other SCAD-specific and SCAD-tailored CR programs currently being developed and implemented (Binnie et al., 2023; Bouchard et al., 2021; Chou et al., 2016). In doing so, the *SCAD Online Support Program* represents an important addition to the clinical services available to SCAD survivors and adds to the collective effort to support their recovery.

Acknowledgements We are extremely grateful to all those who participated in this study.

Author Contributions All authors were involved in the conceptualization and design of this project. Michelle Rogerson, Stephanie Hesselson and Barbara Murphy were involved in data acquisition. Michelle Rogerson, Michael Le Grande, Alun Jackson and Barbara Murphy were involved in the analysis of the data. Michelle Rogerson drafted the

article, and all authors contributed to and have given final approval for the current version to be published.

Funding This project is funded by a Vanguard Grant (ID Number 106709) from the National Heart Foundation of Australia. R.M.G., S.E.I. and S.H. were supported in part by NSW Health Cardiovascular Senior Scientist Grants (RG193092 and RG12159) and an NHMRC Investigator Grant (APP2010203).

Data Availability The datasets generated during and/or analysed during the current study are not publicly available due to ethical requirements based on the sensitive nature of the data and the risk of participant identification. Data are, however, available from the authors upon reasonable request and with permission of the HREC of St Vincent's Hospital Sydney.

Declarations

Conflict of interest The authors Michelle C. Rogerson, Rosemary O. Higgins, Michael R. Le Grande, Stephanie Hesselton, Siiri E. Iismaa, Jodi Brown, Alex Wynd, Donita Baird, Sarah Zaman, Sarah Ford, Trudi Musgrave-Edwards, Sarah T. Clarke, Robert M. Graham, Alun C. Jackson, and Barbara M. Murphy declare that they have no conflict of interest.

Human and Animal Rights The study conformed to the principles outlined in the Declaration of Helsinki and was approved by the Human Research Ethics Committee (HREC) of St Vincent's Hospital Sydney (2019/ETH03171).

Informed Consent Informed consent was obtained from all individual participants included in the study.

Consent to Publish Participants provided consent for their data to be published.

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