

Acceptability and feasibility of an e-mental health intervention for parents of childhood cancer survivors: “Cascade”

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Abstract

Purpose The aim of this study was to evaluate the feasibility and acceptability of “Cascade”: an online, group-based, cognitive behavioral therapy intervention, delivered “live” by a psychologist, to assist parents of children who have completed cancer treatment.

Methods Forty-seven parents were randomized to Cascade ($n=25$) or a 6-month waitlist ($n=22$). Parents completed questionnaires at baseline, 1–2 weeks and 6 months post-intervention. Thirty parents completed full evaluations of the Cascade program ($n=21$ randomized to Cascade, $n=9$ completed Cascade post-waitlist).

Results Ninety-six percent of Cascade participants completed the intervention ($n=24/25$). Eighty percent of parents completed every questionnaire (mean completion time 25 min ($SD=12$)). Cascade was described as at least “somewhat” helpful by all parents. None rated Cascade as “very/quite”

burdensome. Parents reported that the “online format was easy to use” ($n=28$, 93.3 %), “I learnt new skills” ($n=28$, 93.3 %), and “I enjoyed talking to others” ($n=29$, 96.7 %). Peer-to-peer benefits were highlighted by good group cohesion scores.

Conclusions Cascade is highly acceptable and feasible. Its online delivery mechanism may address inequities in post-treatment support for parents, a particularly acute concern for rural/remote families. Future research needs to establish the efficacy of the intervention.

Trial registration ACTRN12613000270718, <https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?ACTRN=12613000270718>

Keywords Cancer and oncology · Coping skills and adjustment · Parents · Computer applications/eHealth

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Supporting a child through a life-threatening illness, such as cancer, may be the most distressing challenge a parent will ever face [1]. Treatment completion is therefore a celebrated milestone, with families generally adapting well to cancer survivorship [2]. However, parents can also experience escalating post-treatment concerns as they adopt the daunting responsibility of monitoring their child's health in the wake of diminished hospital support [3]. They may experience increased psychological distress [4] and compromised quality of life (QoL) [5], possibly exacerbated by factors such as social isolation [6] and financial stress [7]. A subset may also develop depression, anxiety, and/or post-traumatic symptomology [8].

While treatment completion can be a time of vulnerability, the resilience displayed by most families requires psychological interventions for this population to address the dual existence of risk and resilience [9]. Two relevant theoretical models, the Uncertainty in Illness model [10] and the Family-Systems-Illness model [11], enable the conceptualization of long-term adaptation to illnesses such as cancer within a competency-focused framework, while highlighting psychological processes that may drive poorer adaptation.

The Uncertainty in Illness model identifies key psychological processes required to successfully manage anxiety associated with illness-related uncertainty [10]. Post-treatment, families face several realistic sources of uncertainty, including the possibility of cancer recurrence [12]. Within this model, parents' automatic appraisals of this uncertainty, and the meaning derived from these appraisals, can influence their psychological adjustment. When uncertainty is appraised as a "threat" to their child's wellbeing, in conjunction with under-developed coping strategies (e.g., ruminative thinking and defensiveness), increased distress may result [13, 14]. By contrast, parents able to frame this uncertainty as an "opportunity" for growth may utilize more adaptive coping strategies, resulting in reduced distress [15]. The Family-Systems-Illness model adds to this conceptualization by highlighting that adaptation to illness at the family level emerges from the interface between the demands of the illness and the family's strengths and vulnerabilities [11]. Together, these two models highlight modifiable psychological processes to target in promoting resilience.

There is evidence that parent-targeted interventions can be effective [16], and that teaching coping strategies in the context of chronic uncertainty can reduce distress [17]. Several reviews have documented that skills-based psychological interventions, such as cognitive behavioral therapy (CBT), are effective in reducing distress in parents/families experiencing distress related to a young person's cancer diagnosis [16]. However, parents of children recovering from cancer may be unable to access face-to-face support, due to factors such as limited healthcare resources and lack of capacity to return to the hospital [18].

The potential for e-mental health interventions to provide evidence-based support for off-treatment families is therefore

clear. Internet-based programs for individuals affected by cancer can be effective [19]. Online interventions may also improve QoL in those who care for someone with a medical condition [20]. E-mental health interventions can play a particularly important role in stepped care or tiered models by providing support for lower risk groups [21]. Families recovering from childhood cancer treatment and returning home to often disparate locations are therefore an ideal target for an e-mental health intervention.

This study therefore aimed to pilot a group-based, e-health, cognitive behavioral intervention to support parents of children recovering from cancer. The study examined the feasibility (aim 1), acceptability (aim 2), and safety and psychological impact (aim 3) of Cascade by asking the following research questions:

1. What proportion of parents opted in to participate, how many completed the intervention, and was it possible to deliver the program content in accordance with the intervention manual?
2. How satisfied were parents with the program content, the intervention sessions and the questionnaire length, and how satisfied were parents and psychologists with the therapeutic relationship and group dynamics developed during Cascade?
3. Was Cascade associated with any changes in parents' quality of life (QoL, the primary outcome), depression, anxiety, fear of recurrence, or family functioning (secondary outcomes)?

Methods

Participants

Parents were eligible if they (i) had a child aged 15 years or younger who had completed cancer treatment with curative intent in the past 5 years, (ii) were able to read English, and (iii) were able to access the Internet in a private location. The study psychologists conducted an initial telephone screening interview following opt-in, prior to randomization. Parents were excluded if, during the interview, they (i) had insufficient English skills; (ii) were experiencing extreme anxiety or depression (reflected in "extremely severe" scores on the Depression, Anxiety, Stress Scales-Short Form [22]) and endorsed serious suicidal intent; (iii) endorsed current symptoms of psychosis or substance abuse; or (iv) had a child who was on active treatment, had relapsed, or was in palliative care.

Procedures

Following institutional review board approval, potential participants from Sydney Children's Hospital, Australia, were

mailed an invitation package comprising a personalized invitation, consent form, and opt-in card. Recruitment occurred in 4 × 12-week blocks (from 2013 to 2014), such that ~50 parents were invited 4 weeks prior to week 1 of each block. Informed consent was obtained from all individual participants included in the study. Independent personnel at Sydney Children’s Hospital used an electronic randomizer to allocate participants to Cascade or the waitlist. A research officer was responsible for enrolling participants in the study. It was not possible for the psychologists, the research officer, and the participants to be blinded. However, the statistician remained blinded until all analyses were completed. In families where both parents wished to participate, parents were enrolled in different groups, in the same condition. Parents who did not have sufficient technical equipment or Internet access were loaned any equipment they needed. Figure 1 illustrates the study flow.

Intervention

CASCADE (Cope, Adapt, Survive: Life after CAncEr) was developed by a multidisciplinary team with many years of experience in pediatric psycho-oncology, including psychologists, pediatric oncologists, social workers, and parent consumers [23]. The manualized program consists of three, weekly, 120-min online sessions delivered through WebEx (Cisco WebEx, USA). Cascade is a synchronous e-mental health intervention as it is delivered “live” by a psychologist in real time. Two psychologists specifically trained in the delivery of Cascade were involved in the running of the program. WebEx is a password-protected video-conferencing program that allows up to six participants to be seen on the screen simultaneously, much like group Skype™. Evidence justifying the key design features of Cascade is presented in Online Resource 1. Driven by the Uncertainty in Illness [10] and the Family-Systems-Illness [11] models, Cascade specifically targets intra- and interpersonal psychological processes important to adaptation in the context of illness. These processes include helpful appraisal (or acceptance) of uncertainty, practical problem solving, and mobilizing social support resources. Evidence-based, cognitive behavioral therapy (CBT) strategies are used to target these core mechanisms of change, with the strategies recommended to parents tailored to cancer-specific concerns (see Online Resource 1). Topic areas discussed in each session were derived from a previous qualitative study [24].

Cascade groups comprised a psychologist plus three to five parents. The same parents attended the same group for all three sessions, led by the same psychologist. After each session, the psychologist sent participants an email with purposefully designed home practice activities. After 6 months, waitlisted parents were invited to participate in Cascade.

Measures

Parents completed questionnaires at baseline (T1), 2 weeks (T2), and 6 months (T3) after participation in Cascade. Waitlist controls were assessed during the waitlist period (T2/T3), and following their participation in Cascade (T4).

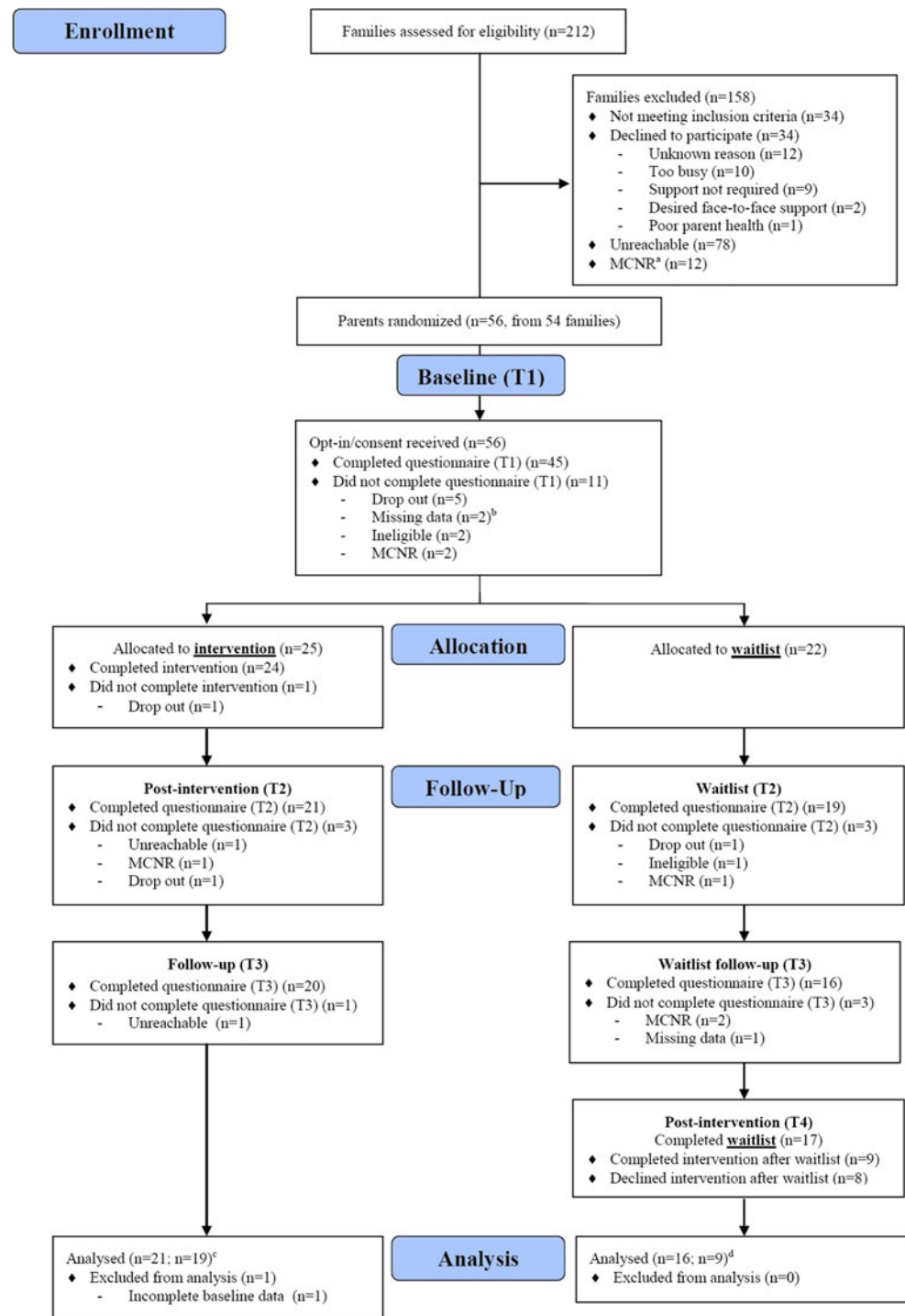
Feasibility We calculated response and attrition rates to determine feasibility (a priori, we defined an 80 % completion rate as feasible). Participants indicated their preference for intervention and questionnaire length (“too long,” “too short,” or “just right”). Following each session, the psychologist recorded which of the manualized session components they had addressed to provide information regarding session fidelity. The psychologists also recorded their clinical impression of each session, rating their (i) comfort running the session, (ii) group-level rapport, (iii) group openness, (iv) sense of trust between participants and the psychologist, (v) peer-to-peer discussion, (vi) group motivation, and (vii) group engagement, on a 10-point scale (where 1 = “low” and 10 = “high”). The psychologists noted any technical difficulties and the extent to which they impacted upon the session on a 10-point rating scale (where 0 = “no impact”, 10 = “extreme interference”).

Acceptability Parents completed the 12-item California Psychotherapy Alliance Scale-Group short version (CALPAS-G) [25] to assess their perceptions of the group cohesion achieved in Cascade. The CALPAS-G contains four subscales, which mostly demonstrated adequate reliability: patient working capacity ($\alpha = .59$), patient commitment ($\alpha = .64$); working strategy consensus ($\alpha = .65$), and member understanding and involvement ($\alpha = .71$) (response options: 0 = “not at all,” 6 = “very much so”). Higher subscale scores indicated more positive appraisals.

The Youth Satisfaction Questionnaire (YSQ) [26] was used to assess intervention satisfaction due to its straightforward assessment of the participants’ satisfaction with health-related services and previous use with parents of young people [27]. The five items include questions such as “Have the services helped you with your life?” to which participants respond either “Yes,” “Somewhat,” or “No.” Purposely designed items also asked parents to rate how beneficial and burdensome participation in Cascade had been (1 = “not at all,” 5 = “very much”).

Quality of life The parents’ quality of life was assessed with the 37-item Quality of Life (QoL)-Family Caregiver Tool [28], which includes physical, psychological, social, and spiritual/existential subscales. The measure has good content validity, reliability, internal consistency, and test/re-test reliability [29].

Fig. 1 Cascade study consort flow chart. *T1* baseline, *T2* post-intervention, *T3* follow-up, *T4* waitlist post-intervention. ^aMCNR Multiple contacts, no response; ^bdid not complete baseline measure, but continued to next time point; ^c*n* = 21 at *T2*, used for feasibility and acceptability analysis; *n* = 19 at *T3*, used for efficacy analysis ^d*n* = 16 at *T3*, used for efficacy analysis; *n* = 9 at *T4*, used for feasibility and acceptability analysis



Psychological functioning The Depression Anxiety Stress Scale short form (DASS-21) [30] consists of three seven-item subscales: depression (α : $T1 = .80$, $T2 = .87$, $T3 = .90$), anxiety (α : $T1 = .64$, $T2 = .86$, $T3 = .79$), and stress (α : $T1 = .83$, $T2 = .86$, $T3 = .89$). Participants used a four-point scale to rate how often they had experienced each symptom in the past week (from “not at all”

to “most of the time”), with higher scores indicating greater distress. The scale has good psychometric properties [31].

Parents’ anxiety about their child’s cancer recurring was assessed with the 22-item Fear of Recurrence Questionnaire-Family Member [32]. Parents used a five-point scale to rate how much they agreed or disagreed with statements about

their concerns regarding their child's health. A higher score indicated greater fear of recurrence.

Family functioning The family communication (6 items; α : T1=.43, T2=.04, T3=.31), problem-solving (5 items; α : T1=.70, T2=.76, T3=.85), and general functioning (12 items; α : T1=.87, T2=.83, T3=.88) subscales of the McMaster Family Assessment Device [33] were used. The scale has been administered to parents and cancer survivors [34].

Statistical analyses

In line with recommendations for pilot studies [35], the target sample size was 40 participants (i.e., ~20 in each group, with a 1:1 allocation ratio). The trial was stopped when this sample was reached. Descriptive statistics were used to analyze feasibility (aim 1) and acceptability (aim 2). This pilot was purposely not powered to evaluate the efficacy of Cascade; however, preliminary analyses of the impact of Cascade were conducted using a 2 (group: waitlist vs. intervention) \times 3 (time point: baseline vs. post-intervention vs. follow-up) mixed analysis of variance (ANOVA). “As-treated” analyses were used. The response rate was calculated by dividing the total number of opt-in families by the total number of invited families (excluding unreachable or ineligible participants). Attrition rates included participants who completed a questionnaire at T1 but not at T3 (see Fig. 1).

Feasibility and acceptability analyses included all Cascade evaluation questionnaires completed at T2 and T4 (parents who participated in Cascade after the waitlist). Parents who did not complete all three T1, T2, and T3 measures were excluded from the psychosocial outcomes analysis. The rurality of residence was assessed using the Accessibility/Remoteness Index of Australia (ARIA), which categorizes areas according to their distance from Australian “service centers” [36]. Thematic analysis was used to explore qualitative responses, guided by the Miles and Huberman [37] framework.

Results

Demographic characteristics (Table 1)

Participation bias Parents who declined to participate did not significantly differ from participating parents in terms of child age ($t=-1.50$; $p=.14$) and sex ($\chi^2=0.08$, $p=.78$) and parent sex ($\chi^2=0.40$, $p=.53$).

Randomization bias There were no significant demographic or cancer treatment differences between parents

randomized to Cascade or to the waitlist. However, Cascade parents were more likely to reside in a regional/remote area ($\chi^2=1.09$, $p=.03$).

Attrition bias The number of parents who dropped out of the study was equally distributed across groups ($\chi^2=0.26$, $p=.61$). Parents who withdrew following T1 did not significantly differ from parents who completed all three time points on demographics including child age ($t=-1.54$; $p=.13$) and sex ($\chi^2=0.10$, $p=.75$), parent age ($t=-1.88$; $p=.07$) and sex ($\chi^2=3.09$, $p=.08$), and baseline measures of quality of life ($t=-0.33$; $p=.74$), anxiety ($t=-0.85$; $p=.40$), depression ($t=-1.57$; $p=.12$), and stress ($t=-0.01$; $p=.99$).

Feasibility (aim 1)

The response rate was 54 % [54 opt-in families/212 (total invited families)—34 (ineligible)—78 (unreachable)]. Most participants ($n=41$, 91.1 %) had Internet access and the necessary technical equipment (e.g., web camera and microphone). The psychologists delivered Cascade to 7 groups across 21 sessions. Ninety-six percent of parents allocated to Cascade ($n=24/25$) remained engaged in the intervention, and 80 % completed every questionnaire (representing an attrition rate of 20 %; (45 T1 completers—36 T3 completers/45 T1 completers)). The structure of Cascade appeared feasible: 40 % of parents ($n=12$) indicated that the existing three weekly, 2-h, sessions were appropriate, with 11 parents (37 %) indicating that they would value more sessions. Six parents (23 %) indicated no session length or duration preference. Data collection was also feasible: it took parents, on average, 25 min to complete each questionnaire (SD=12, range=10–45), and most found this length “just right” (78 %).

Fidelity

Fidelity data revealed good adherence to the intervention manual. The psychologists' reports of session components delivered across the 21 separate sessions indicated that on average, the psychologists delivered 86.9 % of the manualized program components (SD=5.7). The psychologists reported adherence rates of 94.5 % (SD=3.8) for module 1, 90.5 % (SD=7.5) for module 2, and 75.7 % (SD=17.2) for module 3.

Technical difficulties

The psychologists reported a technical difficulty in most sessions ($n=17$, 80.9 %), causing one interruption in eight sessions (47.1 %), 2–3 interruptions in five sessions (29.4 %), and >4 interruptions in four sessions (23.5 %).

Table 1 Baseline demographic characteristics

Characteristic	Cascade (<i>n</i> = 23)	Waitlist control (<i>n</i> = 22)	Test statistic	<i>p</i> value
Parent gender: <i>n</i> (%)				
Male	2 (8.7)	4 (18.2)	$\chi^2 = 0.88$.35
Female	21 (91.3)	18 (81.8)		
Parent age: mean (SD)	42.00 (5.76)	42.77 (5.21)	<i>t</i> = 0.47	.64
Range	(25–50)	(33–55)		
Highest level of education: <i>n</i> (%)				
Year 10 or below	1 (4.3)	–	$\chi^2 = 2.59$.63
Year 12 HSC (leaving)	–	1 (4.5)		
TAFE certificate/diploma, college	8 (34.8)	6 (27.3)		
University degree	7 (30.4)	9 (40.9)		
Higher degree (post-graduate qualification)	7 (30.4)	6 (27.3)		
Child gender: <i>n</i> (%)				
Male	10 (43.5)	15 (68.2)	$\chi^2 = 2.78$.10
Female	13 (56.5)	7 (31.8)		
Child age: mean (SD)	8.48 (3.83)	8.18 (3.84)	<i>t</i> = – 0.26	.79
Range	(2–16)	(3–15)		
Age of child when diagnosed: mean (SD)	5.22 (4.24)	5.72 (4.20)	<i>t</i> = 0.39	.70
Range	(0.3–15)	(0.9–14)		
Time since diagnosis (years): mean (SD)	2.93 (2.14)	2.25 (1.06)	<i>t</i> = –1.25	.22
Range	(0.9–6.6)	(0.7–3.9)		
Child diagnosis: <i>n</i> (%)				
CNS tumors	9 (47.4)	4 (21.1)	$\chi^2 = 6.54$.16
Leukemias	5 (26.3)	7 (36.8)		
Lymphomas	2 (10.5)	5 (26.3)		
Sarcomas	2 (10.5)	–		
Wilms tumor	1 (5.3)	3 (15.8)		
Treatment received: <i>n</i> (%) ^a				
Surgery	12 (63.2)	7 (36.8)	$\chi^2 = 2.63$.11
Chemotherapy	20 (87.0)	19 (86.4)	$\chi^2 = 0.23$.64
Radiotherapy	7 (30.4)	6 (27.3)	$\chi^2 = 0.11$.74
Bone marrow/stem cell transplant ^b	–	3 (13.6)	–	–
Treatment for relapse ^b	2 (8.7)	2 (9.1)	–	–
Other children in the family: <i>n</i> (%)				
Yes	20 (87.0)	18 (81.8)	$\chi^2 = 0.23$.63
No	3 (13.0)	4 (18.2)		
Number of other children in the family: mean (SD)	1.40 (0.68)	1.56 (0.71)	<i>t</i> = 0.69	.49
Range	(1–3)	(1–3)		
ARIA: <i>n</i> (%) ^b				
Major city	17 (73.9)	19 (86.4)	$\chi^2 = 1.09$.03
Regional	6 (25.9)	3 (13.6)		

ARIA Accessibility/Remoteness Index of Australia

^a Parents could tick multiple options for this item

^b Cell size too small for valid chi-square test

When technical issues occurred, the psychologists reported that they were typically resolved in 5 min or less (*n* = 12, 75.0 %), although four sessions experienced a difficulty that persisted for >30 min (25.0 %). The psychologists reported that on average, the perceived disruption had a low impact on session quality and material delivery (*M* = 3.8/10, *SD* = 1.3; range = 2.3–5.3).

Acceptability (aim 2)

Parent-reported acceptability (Table 2)

YSQ data indicated that parents were very satisfied with Cascade and that it met their needs. Most participants positively evaluated Cascade's online format, skills-focused content, and

Table 2 Participant ratings of the acceptability and appropriateness of Cascade

	No n (%)	Somewhat n (%)	Yes n (%)		
Did you like the help you were getting? ^{a,b}	–	3 (10.0)	27 (90.0)		
Did you get the help you wanted? ^{a,b}	–	12 (40.0)	18 (60.0)		
Did you need more help than you got? ^{a,b}	18 (60.0)	8 (26.7)	4 (13.3)		
Were you given more services than you needed? ^{a,b}	27 (90.0)	1 (3.3)	2 (6.7)		
Have the services helped you with your life? ^{a,b}	–	15 (50.0)	15 (50.0)		
	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Online format easy to use ^a	–	2 (6.7)	–	17 (56.7)	11 (36.7)
Module topics relevant to my experience ^a	–	–	2 (6.7)	20 (66.7)	7 (23.3)
Satisfied with amount and quality of information ^a	–	–	3 (10.0)	18 (60.0)	9 (30.0)
Learnt new skills ^a	1 (3.3)	–	1 (3.3)	21 (70.0)	7 (23.3)
Skills relevant to finishing cancer treatment ^c	–	–	5 (17.9)	16 (57.1)	7 (25.0)
Skills useful for moving into survivorship ^a	–	–	4 (13.3)	17 (56.7)	9 (30.0)
Talking about how to use these skills was helpful ^a	–	1 (3.3)	2 (6.7)	19 (63.3)	8 (26.7)
Enjoyed having other people in the group ^a	–	–	1 (3.3)	11 (36.7)	18 (60.0)
Home practice activities helped to put new skills into practice ^a	–	–	3 (10.0)	21 (70.0)	6 (20.0)
Workbook/handouts helpful for understanding and practicing new skills ^d	–	–	4 (13.8)	17 (58.6)	8 (27.6)

^a Data missing for $n = 14$ participants on this item

^b Items from the Youth Satisfaction Questionnaire (YSQ)

^c Data missing for $n = 16$ participants on this item

^d Data missing for $n = 15$ participants on this item

the peer-group setting. Participants also endorsed good CALPAS scores, indicating acceptable group cohesion and therapeutic working alliance (Fig. 2). Most parents indicated that Cascade was “quite” or “very” beneficial ($n = 19$, 70 %). No parent rated Cascade as “very” or “quite” burdensome, although thirteen parents indicated it was “a little bit”

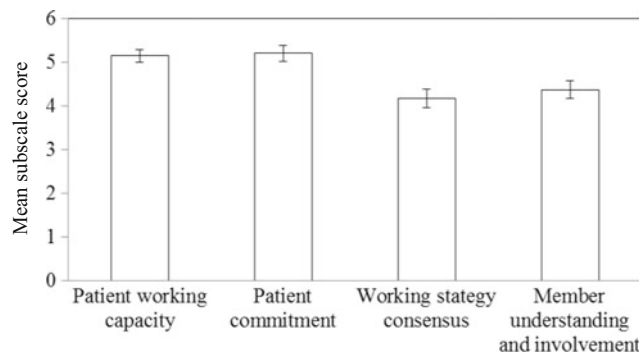


Fig. 2 Mean subscale scores for the California Psychotherapy Alliance Scale (CALPAS-G). A higher score represents a more positive outcome (0 = “not at all”, 6 = “very much so”). Error bars represent the standard error of the mean subscale scores. *PWC* patients’ ability to work actively and purposefully in therapy, *PC* patients’ attitude towards therapy, including commitment to therapy, *WSC* degree of agreement between therapist and patients about how to proceed in therapy, *MUI* patients’ involvement in therapy, including empathetic understanding

($n = 10$, 37 %) or “somewhat” ($n = 3$, 11.1 %) burdensome. Qualitatively, parents noted that Cascade was a significant time commitment ($n = 6$), but that its benefits outweighed the time “cost” ($n = 5/6$). Parents appreciated Cascade as a “non-threatening” and “honest” forum that provided a context for reflection and processing (e.g., “helped consolidate my thoughts and feelings”) and fostered “the realisation that you are not alone.”

Psychologist-reported acceptability (Table 3)

The psychologists’ session ratings increased across the three intervention sessions, suggesting that they became more comfortable and perceived increasing participant engagement, over the course of the three modules. Overall, they rated the level of peer-to-peer conversation, rapport within the group, participant openness, and mutual trust between participants, most highly.

Safety and psychological impact (aim 3) (Table 4)

Participants appeared to be coping well overall: at baseline, few showed severe symptoms of depression ($n = 0$), anxiety ($n = 1$), or stress ($n = 6$). Participants with severe anxiety and

Table 3 Psychologist clinical impressions regarding therapeutic and group processes in Cascade

	Module 1 Mean (SD)	Module 2 Mean (SD)	Module 3 Mean (SD)	Total Mean (SD)
Comfort with running the group	7.7 (1.4)	8.3 (0.8)	8.4 (1.0)	8.2 (0.2)
Perception of rapport within the group	8.0 (1.4)	9.0 (0.6)	9.1 (0.9)	8.7 (0.6)
Perception of how open participants were	8.6 (1.0)	8.4 (1.0)	9.1 (0.9)	8.7 (0.8)
Sense of mutual trust in working with group participants	8.7 (0.8)	8.3 (0.8)	9.0 (0.8)	8.7 (0.8)
Level of peer-to-peer conversation	8.1 (0.9)	8.4 (1.3)	9.2 (0.8)	8.7 (0.7)
Level of group motivation	8.3 (0.5)	8.6 (0.8)	9.0 (0.6)	8.6 (0.4)
Perception of group's engagement with Cascade skills-based content	8.0 (0.8)	8.3 (0.8)	9.0 (1.0)	8.4 (0.4)

stress were equally distributed across Cascade and the waitlist (anxiety: $\chi^2 = .937, p = .333$, stress: $\chi^2 = .581, p = .446$). There was no significant main effect of group (i.e., waitlist vs. intervention) or time (i.e., baseline vs. post-intervention vs. follow-up) on quality of life, psychological functioning, and family functioning. There was a significant main effect of time on the fear of cancer recurrence ($F = 8.63, p < .01, \eta_p^2 = .22$), such that the fear of cancer recurrence was significantly lower at T2 ($F = 37.57, p < .01, \eta_p^2 = .56$), and T3 ($F = 7.03, p = .01, \eta_p^2 = .19$) for both groups.

Discussion

Online interventions present a promising model of support for parents after their child's cancer treatment, as they take into account barriers to care [38]. Cascade appears to be feasible and highly acceptable, and its efficacy is worthy of further evaluation. Good evidence emerged for Cascade's feasibility (aim 1). Good opt-in and attrition rates reflect a population that was receptive to psychological support. Parents indicated that the session structure was practicable, with many satisfied with the number of intervention sessions, or requesting more.

Despite frequent minor technical difficulties, these did not appear to adversely impact the delivery of session content or participant or psychologist engagement. Given that practitioner anxiety regarding potential technical difficulties is one of the key barriers to the uptake of e-mental health services [39], the minimal impact of technical difficulties in this trial is encouraging.

A strength of this study was its inclusion of parent and psychologist perspectives. Data from both perspectives demonstrated that Cascade was highly acceptable (aim 2). The psychologists' increasing session ratings across the three sessions likely reflected the steady development of group rapport across sessions. Increasing rapport over time may explain why the psychologists' adherence to the manual dropped somewhat in the final session, as participants began to talk most openly about their experiences. Consistent with psychologist impressions, almost all parents were highly satisfied with the skills taught during Cascade and indicated that its benefits outweighed the "burdens." Parents' reported high levels of satisfaction with group support, with group cohesion scores equivalent to face-to-face group interventions [40]. This may speak to the power of sharing and normalization of

Table 4 Mean scores (standard deviations) and proportion of participants meeting reliable change indices on key outcome measures assessed at baseline and post-intervention

Measure	Cascade <i>n</i> = 19			Waitlist control <i>n</i> = 16		
	T1	T2	T3	T1	T2	T3
Quality of life	24.05 (3.88)	24.52 (2.80)	25.03 (3.63)	24.44 (4.73)	23.51 (4.69)	24.81 (4.24)
Depression	6.84 (6.16)	6.95 (5.90)	8.95 (9.62)	4.63 (4.36)	9.38 (6.96)	5.75 (4.95)
Anxiety	4.63 (5.42)	5.47 (7.24)	5.79 (7.05)	4.00 (4.34)	6.80 (8.31)	3.33 (2.99)
Stress	14.89 (8.15)	15.11 (7.89)	14.22 (10.40)	13.88 (8.18)	16.75 (10.01)	12.13 (6.17)
Fear of recurrence	85.94 (11.63)	84.59 (12.10)	79.88 (10.86)	89.20 (10.16)	88.20 (9.26)	86.13 (9.57)
Family functioning						
Communication	2.50 (0.27)	2.52 (0.20)	2.49 (0.25)	2.57 (0.28)	2.61 (0.21)	2.61 (0.29)
Problem solving	1.87 (0.30)	1.89 (0.20)	1.86 (0.28)	2.00 (0.15)	1.92 (0.22)	1.86 (0.28)
General functioning	1.68 (0.35)	1.72 (0.37)	1.71 (0.38)	1.82 (0.43)	1.86 (0.30)	1.71 (0.42)

common emotional experiences [41, 42] and the translatability of this type of support to the online domain.

Despite the encouraging feasibility and acceptability data, no significant results emerged to indicate that the program improved parents' QoL or reduced distress. The reduction in parents' fear of their child's cancer recurrence in both groups likely reflects the natural trajectory of this concern after cancer [4]. Despite existing literature pointing to the potential for online, skills-based interventions to improve the adaptation of parents following cancer treatment, it is too early to determine whether online programs such as Cascade are efficacious.

Despite being adequate for a pilot study [35], the small sample size was a key limitation and precluded our capacity to detect any intervention effects. Apart from the small sample, there are several additional reasons why the program may not have yielded significant effects. Parents may not have received an adequate "dose" of the intervention across the three sessions. Including additional sessions can increase intervention efficacy [43]. We have therefore modified Cascade by adding a fourth group session, and a one-on-one booster. This will allow more detailed in-session discussion of coping strategies and increased time for experiential practice. A four-module (plus booster) program is likely to be acceptable, given that many parents requested additional sessions. Also, the current sample was not clinically distressed and represented parents who had already had up to 5 years to adjust to their child's survivorship. Our findings are therefore consistent with other oncology studies, which have documented that interventions that "select" populations who are clinically distressed are more likely to yield significant results [44].

Further, while participants resided in many parts of the state of New South Wales, the hospital's catchment area has residents of a higher than average socioeconomic status relative to other areas. Families from culturally and linguistically diverse (CALD) backgrounds were under-represented, which is a gap given that CALD status is associated with poorer outcomes [45]. Similar to many pediatric oncology interventions, the study had a low representation of fathers. It is critical that future studies better engage this under-supported group. Additional limitations include the lack of external fidelity checks and the absence of an attention control group. It will be important to add these elements to future trials of the Cascade program.

These limitations notwithstanding, the positive outcomes achieved for the program's feasibility and acceptability are encouraging for the development of future online interventions targeting not only this group but also parents of children affected by other serious illnesses. Given the crucial importance of parents' adaptation in supporting their children's psychological functioning [46], future evaluations assessing their impact on the children in the family would be an important extension.

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Compliance with ethical standards

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Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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