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Randomised controlled pilot trial of the *EndoSMS* supportive text message intervention for individuals with endometriosis: Feasibility and acceptability results

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ABSTRACT

Objective: Diminished quality of life, inadequate support and social isolation are commonly experienced by individuals living with the chronic pain condition, endometriosis. We aimed to determine the feasibility and acceptability of *EndoSMS*, a psychologically-focused text message intervention designed to support individuals living with endometriosis.

Methods: As part of a two-arm parallel pilot randomised controlled trial with waitlist control, the feasibility and acceptability of a brief (3-month) version of *EndoSMS* was assessed using a mixed methods approach. Feasibility data (uptake, attrition, text message delivery analytics) and user acceptability (via self-report survey items and written feedback) were assessed. Qualitative data were thematically analysed using the template approach. Primary trial outcomes are not reported in this paper.

Results: Feasibility was indicated by: high conversion rate (99.1 %), low attrition (14.2 %), few opt-outs (0.02 %) and a high message delivery rate (99.8 %). Most intervention participants indicated user acceptability (mean = 4.02/5) across self-report questions. Most rated the length of the program (65.5 %), and the number (80.9 %) and language (94.5 %) of the text messages to be 'just right'. Thematic analysis created four themes: A shared "battle": Feeling less isolated and alone; "Be kind to yourself": A focus on self-care, self-compassion and active coping; Keeping endometriosis at the forefront: Helpful or stressful?; Mixed perceptions surrounding the provision of general endometriosis information; and, Tailoring of text messages.

Conclusion: *EndoSMS* supportive text message program was feasible and acceptable for individuals with endometriosis. Future developments of the program should consider greater tailoring of content to user needs.

Trial Registration: Australian New Zealand Clinical Trials Registry (ACTRN12621001642875).

1. Introduction

Endometriosis is a chronic, inflammatory condition characterised by painful and fluctuating physical symptoms [1,2]. Psychological sequelae

include diminished health-related quality of life (HRQoL) [3] and capacity to undertake daily activities (e.g., work, social, exercise), depression and anxiety [4–7]. Feelings of social isolation are commonly reported, and are associated with withdrawal from social activities to

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cope with the symptom burden [8–10]. Despite endometriosis being a condition demanding ongoing monitoring and medical management, many people report feeling isolated and poorly supported [11]. This sense of isolation is particularly evident for those living some distance from major cities where most specialist endometriosis services are located [12]. Perceived stigma [8] and diminished patient empowerment can also be barriers to seeking supportive services for people affected by endometriosis [10,13], and for accessing supportive services more generally [14,15]. The combined psychological burdens of feeling unsupported and socially isolated, in addition to experiencing psychological distress (e.g., depression, anxiety) points to a need for psychologically-supportive interventions [1,16,17]. Emerging evidence suggests psychological interventions utilizing therapeutic techniques such as mindfulness and acceptance-based approaches [18] can help improve HRQoL for people with endometriosis. Although promising, these interventions are labour and cost intensive, and typically located within metropolitan areas [19]. In countries such as Australia, where 40 % of the population does not live in a major metropolitan city with easy access of specialist services [12], the mode of intervention delivery is a key consideration to ensure equity of access. In light of healthcare budgetary constraints [20], low-cost and readily accessible supportive interventions such as digital modalities (delivered by mobile phone technology and utilizing online platforms) [21–23] are increasingly utilised to deliver psychologically-focused interventions that have broad accessibility, low cost and high user acceptability [24–27].

To address the gaps in service provision and better support individuals with endometriosis, we co-designed a novel, text-message intervention (*EndoSMS*) [see 26 for development paper]. Informed by endometriosis consumers and health professionals, *EndoSMS* comprises 371 text messages with a focus on topics related to emotional wellbeing (e.g., recognizing signs of anxiety and seeking help), self-care (e.g., adopting a self-compassionate stance [28,29]), social support (e.g., advice on utilizing existing social networks) and empowerment to advocate for themselves in healthcare settings and manage difficult interpersonal issues (e.g., seeking time off work or special consideration, navigating intimate relationships). Additional text messages provide general endometriosis information and advice for improving physical wellbeing [30], based on the current evidence-base [31]. Those taking prescribed medications for their condition can also opt-in to receive text messages aimed to assist with promoting medication adherence. *EndoSMS* is designed to be delivered for a period of six months, with semi-personalized (i.e., preferred name) texts sent randomly four times per week [30]. Moreover, in response to consumer input during *EndoSMS* development, we ensured users could tailor the receipt of *EndoSMS* messages to the recipient's preferred time of day [30].

It is critical that psychosocial interventions demonstrate acceptability from a user perspective, and feasibility in terms of delivery [32]. Mixed methods approaches are ideally suited for evaluating interventions, as they allow for summarization and quantification of intervention feasibility and acceptability, and also permit an in-depth exploration of nuances in user experiences, to tease out potential areas for intervention improvement [33]. Using a mixed methods approach, we gathered initial feasibility and acceptability data for the program alongside our development process [30]. We found a frequency of four text messages per week to be an optimal delivery schedule according to the consumer focus groups [30]. A delivery rate of 4 text messages per week is also consistent with similar text message interventions that address other physical illness populations [34,35]. The *EndoSMS* development process revealed that the co-designed text messages were highly acceptable, relevant and readable, as rated by a panel of consumers and healthcare professionals [30]. Such promising results provided support for the feasibility and acceptability of the *EndoSMS* text messages in a small, but socio-demographically diverse sample of individuals, who played a critical role in intervention development. However, confirmation of the acceptability and feasibility of the *EndoSMS* intervention in a broader endometriosis population is needed.

We designed a pilot randomised controlled trial (RCT) of half duration (i.e., three months delivery of text messages due to financial and time constraints) to provide feasibility and user acceptability data [see [36] for protocol paper] from a larger sample of Australians living with endometriosis. Cost is an important consideration for intervention sustainability and future implementation, however this is often neglected in current research [37]. Utilizing a mixed methods approach, this paper reports on the user experience of *EndoSMS* in terms of perceived acceptability and documents the interventions' feasibility and cost in a newly recruited and larger sample of individuals living with endometriosis, who received the brief 3-month *EndoSMS* intervention.

2. Methods

2.1. Design

This is a mixed-methods study nested within a 3-month, brief pilot RCT of *EndoSMS* (*EndoSMS* = 139, Waitlist = 135) [see 34 for the full protocol]. The trial was registered with the Australian New Zealand Clinical Trials Registry (#ACTRN12621001642875). Due to unprecedented COVID-related delays in several research processes (ethics approval, protocol registration) in Australia during 2021 (when this research was conducted), combined with the need to pre-book slots for advertising the project via online communities, data collection ended up commencing 12 days prior to protocol registration; and thus, this trial is listed as being retrospectively registered. This pilot trial adheres to CONSORT [38] guidelines (see Supplementary File 1). As detailed more thoroughly in the protocol paper [36], participants were randomised to either the intervention (*EndoSMS*) or control condition after completing the online baseline survey in a uniform 1:1 allocation ratio ([randomizer.org](#)). Ethics approval was granted from the Macquarie University Human Research Ethics Committee (#52021963527729). This paper reports on user acceptability, feasibility and cost data from the trial. As per the published pilot trial protocol [36], a separate second paper is planned for publication that reports on separate data we collected from the trial regarding preliminary efficacy in terms of the primary and secondary outcome measures.

2.2. Participants

Participants ($N = 304$) were recruited from Endometriosis Australia, an Australian-peak body for endometriosis, with a nationwide following of more than 40,000 followers. Participants were eligible to participate if they self-reported being: (1) 18 years or over; (2) clinically diagnosed with endometriosis; (3) located in Australia; (4) English-language proficient; and having (5) internet and mobile phone [36]. During the post-intervention follow-up survey, participants allocated to the *EndoSMS* intervention ($n = 139$) completed questions rating the user experience and provided qualitative feedback via open-ended questions [36].

2.3. Intervention

The development of *EndoSMS*, a co-designed supportive text message intervention for individuals with endometriosis, is described in detail separately [see 26 for development paper]. Briefly, *EndoSMS* was developed using a 2-phase mixed methods approach, wherein (1) focus groups with consumer representatives guided the structure and content of the text message intervention, with the content later being evaluated by (2) consumer representatives and healthcare professionals using survey methodology [30]. Text messages cover a range of topics (general endometriosis information, physical health, emotional health, looking after and caring for your body, social support, patient empowerment, interpersonal issues) [see 26 for example text messages] and are based on best practice guidelines (e.g., Endometriosis Australia and Jean Hailes' Foundation websites) and relevant psychological theory (e.g., self-compassion theory [39]). As further described in the protocol paper

[34], recipients receive four semi-personalized text messages (to their preferred name) randomly across the week during their preferred timeslot (e.g., morning, day, evening), and cover a random assortment of text message themes (not labelled).

2.4. Data sources

Data sources for this mixed-methods analysis included:

2.5. Feasibility

Recruitment and retention rates: the number of participants visiting the survey site, consenting, completing baseline and post-intervention measures were documented. Attrition (i.e., from accessing the study site to providing consent; from consent to baseline survey completion; from baseline to post-intervention) greater than 20 % was considered indicative of feasibility issues [38].

Text message delivery software analytics: text messages were delivered (November 2021 to March 2022) using automated software (BurstSMS; <https://burstsms.com.au/>). To assess if the intervention was delivered as planned (i.e., intervention fidelity [40]), the number of text messages that were sent, successfully delivered, not delivered successfully (“bounced”), or resulted in an “opt out” were documented.

2.6. Costs

Costs associated with delivering the 3-month trial were determined by summing the subscription costs for the automatic text messaging system program (BurstSMS from Kudosity) and the costs of each text message. To determine an individual cost per text message, total costs were divided by the number of text messages sent.

2.7. User acceptability

User experience feedback was collected from participants allocated to the intervention group regarding the suitability and perceived utility of the text messages. Questions that were asked had been used in a previous evaluation of a supportive text message intervention for women with a chronic health condition (breast cancer) [34]. More specifically, we used ten 5-point Likert-type questions (e.g., “I found the messages useful”) with response options ranging from “strongly disagree” (1) to “strongly agree” (5). An average score of 3 or more indicated adequate acceptability. Acceptability was further assessed through three yes/no questions regarding intervention usage (e.g., Did you save any of the text messages you received?) and three items rating the intervention structure (The language of the text messages was: Casual/Just right/Formal; The number of messages I received was: Too many/Just right/Too few; The program length of 3 months was: Too long/Just right/Too short). Five open-text free-response questions (“What did you find most useful about the text messages?” “What was your favourite message(s)?” “What did you find least useful about the text messages?” “Were there message(s) you didn’t like?” “Do you have any suggestions to improve our text messaging program?”) further assessed the user experience.

2.8. Analyses

Data were de-identified prior to analysis. Quantitative analyses were carried out using SPSS version 27. Descriptive statistics (means and standard deviations for continuous variables; frequencies and percentages for categorical variables) were used to provide sample characteristics, retention rates, quantitative acceptability ratings and SMS-system delivery data (e.g., number of sent messages vs. bounced messages). Qualitative participant feedback on *EndoSMS* was thematically analysed [41] using NVivo version 12 with three independent coders (MJP, CP, KS) applying a six-stage inductive template approach [42,43]. Steps in

the qualitative analysis included: familiarization with the data set; generation of initial codes; searching, refining and defining themes; and integrating results to construct a report. The coders were experienced researchers with expertise in psychology, chronic disease management, and mixed-methods research. The qualitative analysis was guided by a critical realist ontological perspective with an interpretivist approach to epistemology acknowledging potential researcher biases regarding data collection and analysis [44]. Reflexivity statements of researchers involved in the qualitative data analysis are provided in Supplementary File 1.

3. Results

3.1. Feasibility

In total 337 individuals visited the survey link in response to the study invitation distributed via Endometriosis Australia’s social media. Of these, 334 (99.1 %) provided online consent and 224 (81.3 %) participants completed at least 70 % of the survey and were randomly assigned to the intervention or control conditions. Of 139 participants randomised to *EndoSMS*, 110 (79.1 %) provided feedback on the intervention. Participants ($M_{\text{age}} = 33.1$, $SD = 7.4$) were mostly Australian-born (88.2 %), in a relationship (63.6 %) and currently employed (79.1 %) (see Table 1 for sample characteristics).

There were no sociodemographic differences between those only completing the baseline survey (early terminators $n = 30$), compared with those completing the study, with the exception that early terminators reported receiving fewer endometriosis-related treatments in the past 12 months ($M = 1$, $SD = 0.71$) ($M = 1.38$, $SD = 0.79$), $t = -2.73$, $p = .007$, $d = -0.53$ (see Supplementary File 2). Of the 274 participants

Table 1

Intervention Feedback Participants’ Demographic and Medical Characteristics at Baseline.

Variables - n(%)	Sample (n = 110)
<u>Age (yrs)^a - M(SD)</u>	33.1(7.4)
Australian born	97(88.2)
<u>Indigenous Australians</u>	6(5.5)
Regional/Remote resident	39(35.5)
<u>Marital Status</u>	
Single	34(30.9)
Married/De facto	70(63.6)
Separated/Divorced	6(5.5)
<u>Education</u>	
High school education or less	20(18.2)
Vocational/TAFE	32(29.1)
Undergraduate degree	32(29.1)
Postgraduate degree	26(23.6)
<u>Employment status</u>	
Employed	87(79.1)
Unemployed	9(8.2)
Other	14(12.7)
<u>Diagnostic delay (yrs)^a - M(SD)</u>	10.15(6.6)
No. of treatments - M(SD)	1.34(0.7)
Self-reported infertility	30(27.3)
Current smoker	6(5.5)
Taking hormonal medication	47(42.7)
Medication adherence difficulties	8(22.9)

Notes. TAFE – Technical and Further Education. Employment options included full or part-time work, casual and self-employed arrangements; Other employment status included students and stay-at-home parents; Participants were asked how many endometriosis related treatments they had received in the past 12 months (options included: (1) surgery, (2) hormonal medication, (3) pain medication, (4) self-management or other alternative therapeutic approaches) and the number of treatments selected was summed; Participants self-reported taking hormonal medication (combined estrogen/progestin, progestin, GnRH, aromatase) as a treatment for endometriosis; the time between first display of symptoms and endometriosis diagnosis is in years.

^a Sample sizes vary due to incomplete data. This already seems to be in the paper. It should be below Table 1 and it already seems to be there

randomised, 39 (14.2 %) were lost to follow-up (85.8 % retention; see Fig. 1). There were no sociodemographic differences between study completers and those lost to follow-up (see Supplementary File 2). There was no difference in drop-out rates between conditions, (86.3 % intervention, 85.2 % control; $\chi^2 = 0.07, p = .79$).

In total 5253 text messages were sent (November 2021 – March 2022) to intervention participants. Of these, 5242 (99.8 %) were delivered successfully, with 11 (0.02 %) bouncing. Three participants opted-out of the messages, with one sending a response.

3.2. Costs

The total costs for the 3-month trial came to \$654.20, with text messages sent at a rate of \$0.068AUD and a \$99AUD monthly account fee for use of the text messaging service. Accounting for the monthly text message fee, the cost of text messages on average across the trial was \$0.12AUD.

3.3. Acceptability

3.3.1. Quantitative feedback

The average rating across all Likert scale user acceptability questions was 4.02 (SD = 1.07), demonstrating adequate acceptability (see Table 2). Average ratings for individual items ranged from 3.65 to 4.6, indicating participants found the text messages appealing, useful and

Table 2
Intervention Acceptability Likert-Scale Ratings.

Variable – M(SD)	Total Sample (n = 110)
Useful	3.65(1.07)
Easy to understand	4.61(0.83)
Appropriate time of day	4.07(0.98)
Appealed to me	3.67(1.16)
Comfortable receiving	4.26(1.00)
Happy to receive again	4.00(1.22)
Would recommend to friends	3.85(1.20)
Total	4.02(1.07)

Notes. Items rated on a 5-point Likert scale from Strongly Disagree (1) to Strongly Agree (5).

easy to understand, and delivered at an appropriate time of day; with participants being comfortable receiving them, happy to receive them again and willing to recommend *EndoSMS* to friends. For the medication difficulties subgroup, participants on average agreed the text messages reminded them to take their medication.

Most participants rated the language of the text messages (94.5 %) and the number of text messages received (80.9 %) as ‘just right’ (see Table 3). While many participants (65.5 %) rated the 3-month program length as ‘just right’, a third indicated it was ‘too short’.

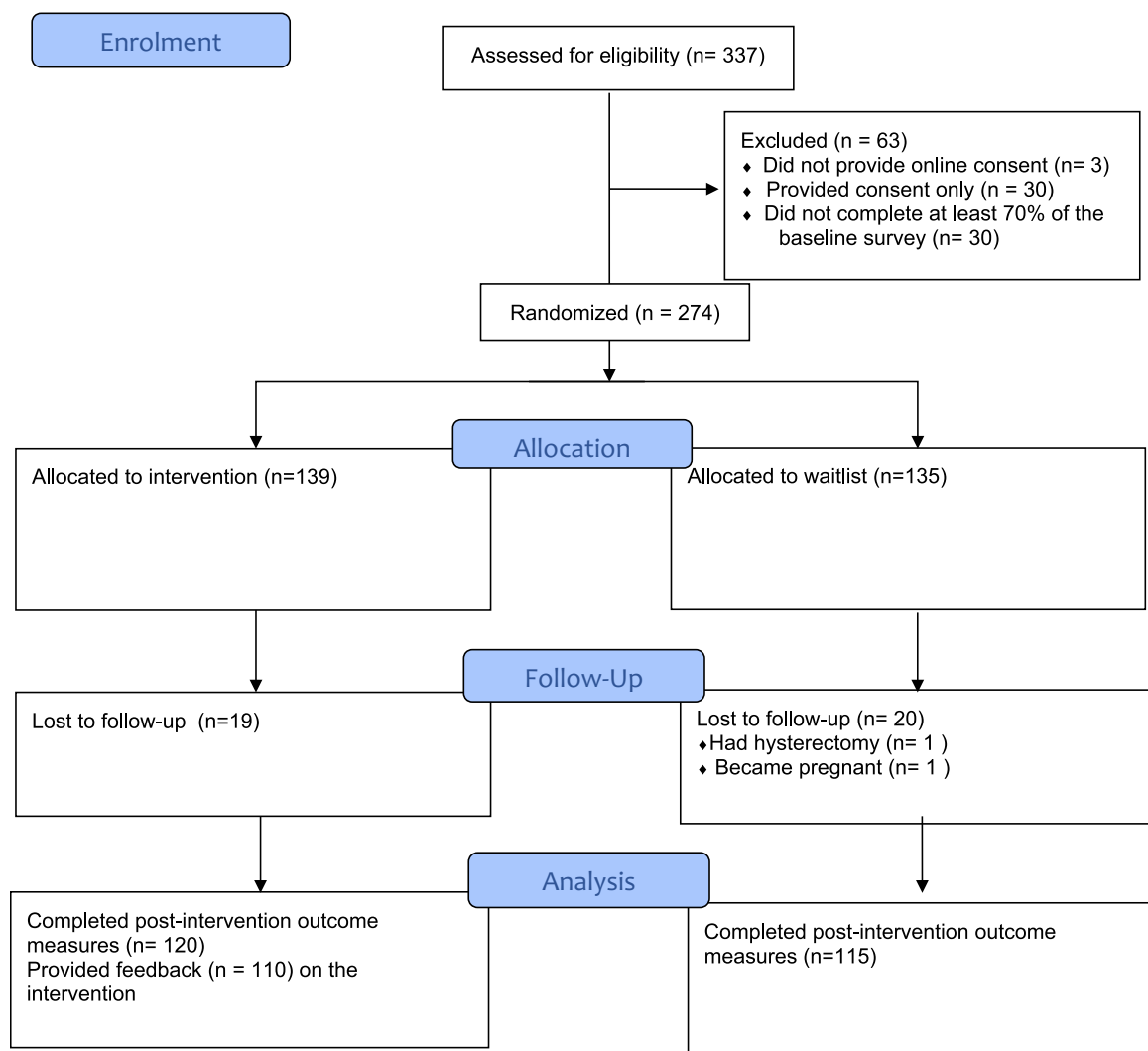


Fig. 1. Participants flow through the study.

Table 3
Feedback on Text Message Program Structure.

Variable – %(n)	Sample (n = 110)
Text Message Language	
Casual	1.8 %(2)
Just Right	95.5 %(105)
Formal	2.7 %(3)
No. of Messages Received	
Too many	11.8 %(13)
Just Right	80.9 %(89)
Too few	7.3 %(8)
Program Length^a	
Too Long	3.6 % (4)
Just Right	65.5 % (72)
Too Short	30.0 % (33)

Notes. ^aSample sizes vary due to incomplete data.

3.3.2. Qualitative feedback

Fifty-five (39.6 %) of the participants randomised to *EndoSMS* provided written feedback on the intervention. Qualitative analysis created five overarching themes: A shared “battle”: Feeling less isolated and alone; “Be kind to yourself”: A focus on self-care, self-compassion and active coping; Keeping endometriosis at the forefront: Helpful or stressful?; Mixed perceptions surrounding the provision of general endometriosis information; and, Tailoring of text messages. De-identified illustrative quotes are presented with participants’ ID numbers, prefixed with a ‘P’ for participant. Additional supporting quotes for each theme are provided in Supplementary File 3.

3.3.2.1. A shared “battle”: Feeling less isolated and alone. Many participants indicated that the text messages helped ease their sense of feeling isolated, with the text messages functioning as a ‘reminder’ that they were not alone. The repetition of phrases like “feeling less alone,” “I’m not alone,” and “felt less alone” highlights the isolating nature of endometriosis and suggests the importance of finding a “community” that has a shared understanding of “what I am going through” P59. This was exemplified by participants reporting feeling supported, as if someone understood and cared for them: “Like someone who understood was thinking of me” P122 and “The messages felt comforting - like there was someone out there actually thinking and considering how endometriosis was affecting me.” P275. In this account the use of the word “actually” implies that the participant’s supportive needs or care may have been overlooked or minimised previously, and that the text-messages acted to fill this gap, a shift which was “comforting”. In referencing a sense of being cared for, several participants further remarked that this positive feeling of reassurance was nonetheless engendered by an inanimate text message program where the texts were being personified – i.e., “someone out there” P275, “other people out there” P59 “come from people who care” P241, “someone else understood” P260 and “someone checking in” P273. This was further exemplified by P140 who “Felt nice just having someone “check in”, even though it wasn’t actually a person” who was cognisant that the messages were not sent by a person, but nonetheless provided a sense of being cared for. This personification of the messages may also be an indirect reference to the participants being aware that the messages were developed by a team of endometriosis researchers, potentially reflecting their sense of connection with the development team.

Related to this was a sense of shared suffering and connection to others who also experience endometriosis: “Sometimes they [messages] would mimic exactly what I was battling with that day and ultimately make me feel like it wasn’t just me dealing with this. That someone else out there feels the same.” P51. This acted to normalize participants’ experiences, which was validating. One participant shared, “[I found it useful that the text messages] told me that what I was experiencing was normal and other people had the same experience. That was very important.” P258. These accounts suggest that knowing others also experience similar difficulties associated with endometriosis helps to alleviate feeling ‘different’ or ‘abnormal’, reducing self-doubt and reinforcing that they are not

isolated in their journey. This also reflects the sense of common humanity that was highlighted in compassion-focussed messages.

3.3.2.2. “Be kind to yourself”: A focus on self-care, self-compassion and active coping. For many, the text messages reminded participants to engage in self-care, “[A] reminder about the things I already know to do but can forget to look after myself properly.” P214, “a reminder to check in with myself” P123, and “they were nice self-care reminders” P225. The text messages motivated and empowered participants to actively manage their condition – “helped me feel like I could get help” P260 – including finding an endometriosis specialist and prompting questions to ask healthcare professionals: “The specialist I was waiting for surgery with stopped working in the public system suddenly and I needed a new specialist. This [the text messages] helped me find one.” P53 The messages also encouraged participants to undertake their own research on endometriosis, which participants liked (e.g., ‘Doing some of your own research on endometriosis using trusted sources can be empowering! Check out Endo AU as a trusted source <https://tinyurl.com/aboutendo>’). These findings suggest that the reminders may have aided participants to manage their symptoms more effectively through engaging in self-care and providing links to trusted resources reducing the burden of searching for helpful information, including appropriate healthcare professionals.

Participants particularly liked messages that encouraged them to be more self-compassionate (e.g., ‘Hey [name], we all experience pain sometimes. Remember to be kind to yourself by giving yourself the time to rest and recover’ ‘Hey [name], had to cancel some plans today because of pain? Don’t sweat it. You’ve done well to put your health first!’). They also reported liking text messages reassuring them that they were allowed to ‘not be ok’ (e.g., the message ‘..fertility isn’t always fair. It’s okay to feel frustrated’): “[I liked] the ones that let me know it was okay if I couldn’t do the things I wanted to do or would normally do.” P307). These accounts suggest that the text message may have acted to counter feelings of inadequacy or guilt that are often associated with not being able to perform daily tasks as usual or needing more rest than others due to endometriosis symptoms.

In particular, several participants noted the value of messages that provided them with affirmations (e.g., ‘Hey [name], you are worthy.’ and ‘You are important and you are beautiful. Have a great day!’). Participants liked the positive, supportive and encouraging tone of the text messages (e.g., ‘Hey, remember to celebrate your daily wins with the people who support you!’) that filled a perceived gap, “they were nice text messages too, really supportive which is nice because I don’t get that in my life.” P53. This was reinforced by participants sharing that they ‘looked forward’ to receiving the messages: “I liked that I was getting little surprise deliveries all the time – like if you’ve ever had a bunch of flowers delivered.” P25.

3.3.2.3. Keeping endometriosis at the forefront: Helpful or stressful?. Many participants felt the text messages brought endometriosis to the forefront of their minds: “Life gets super busy, and endo[metriosis] can hit you when you least expect it and bring it dragging to the forefront of your mind. The texts [messages] helped me keep endo[metriosis] within my consciousness.” P31. For some, this was a welcome addition to their busy day, helping them to be mindful of their condition, described by one participant as “a nice reminder and check in” P21. For a minority of others, the text messages were an unwelcome reminder of their chronic illness (“Mostly it was the daily reminder that I am suffering from a condition that most people don’t have to deal with.” P197 and “just served as a regular reminder that I have a chronic illness when I may not have been thinking about it.” P206), which upset them, “Sometimes it’s hard to hear things you already know and practise when you are suffering badly.” P26. This was particularly the case when participants received messages on “days where I wasn’t in pain” P307. These accounts indicate that for some, a reminder of their chronic illness can disrupt their sense of normalcy or

bring the challenges of endometriosis to their attention, when they were otherwise feeling well.

3.3.2.4. Mixed perceptions surrounding the provision of general endometriosis information. Some participants liked the general endometriosis information that the text messages provided, finding it to be ‘handy’ and ‘helpful’: “They also provided useful information that isn’t explained to me by my healthcare professionals.” P260. Text messages with links to further information were particularly valued (e.g., ‘Have you heard that a low FODMAP diet can help reduce endometriosis symptoms but are not sure what that means? Read more here: <https://tinyurl.com/fodmapendo>’), with suggestions made for more of this type of text message in *EndoSMS*. However, a few participants indicated the general endometriosis information (e.g., ‘Hey [name], if you experience heavy bleeding, wearing a tampon and a pad at the same time can help with leakage.’) was too generic for their specific needs. This was particularly the case for participants who felt they were well informed about their condition:

“I found that they were too basic – I already knew a lot of the information provided. *Endo[metriosis] patients often know more about the disease than their own doctors because we have to do our own research and advocate for ourselves.*” P151

In this account, the participant refers to “*endometriosis patients*” as being highly informed about their illness due to a history of needing to self-advocate. This may reflect a broader discourse where individuals with chronic conditions often become experts in their own care, highlighting the importance of providing information to suit a range of different levels of awareness and understanding. For a small minority, this basic information was experienced negatively, as being condescending (“*Sadly I found the entry level content of the messages to be almost patronising.*” P341). This underscores the need to address and tailor the messaging to the specific concerns of those receiving text messages, to avoid frustration or the potential for disengagement.

3.3.2.5. Tailoring of text messages. Related to the different perceptions of general endometriosis information provided in some *EndoSMS* messages, participants had differing views on the relevance of the text message content to them personally. Although participants indicated the text messages were highly relevant (“*I found the texts relatable to my current life circumstances.*” P169), many reported the need for greater personalisation as not all of the text messages were applicable to their personal circumstances: “*They aren’t really tailored to my needs and I got a few that don’t apply to me.*” P343. For example, those who were further along in their endometriosis journey indicated a need for more advanced content, “*Some of the texts weren’t suitable for someone who has had chronic illness for a long time and therefore has explored many avenues of support.*” P225. Some of the other aspects touched on in the messages that participants indicated were less relevant to their circumstances included infertility, managing painful periods, navigating school/work leave and recipes containing meat (for vegetarians). Further, some felt the text message frequency (4/week) was too much and wanted a level of personalisation that would allow less frequent messaging.

4. Discussion

This study aimed to evaluate the user acceptability, feasibility and cost of the *EndoSMS* text message intervention following a shortened (3-month) delivery via a randomised controlled trial [36]. Findings provide support for the intervention being feasible, acceptable and low cost. Feasibility was demonstrated through a very high conversion rate, modest drop-out rate and high intervention fidelity. User acceptability was demonstrated by a high average rating across acceptability items, indicating that participants felt comfortable receiving the text messages, which they found easy to understand and appealing and rated the message content as useful. Further, there was very strong endorsement that the language of the text messages was appropriate for the target

audience, being neither too formal nor too casual. Intervention costs were low (\$650AUD), with no cost incurred by text message recipients, indicating high potential for sustainability of this intervention approach in the long term.

4.1. Quantitative findings

There was a very high conversion rate from individuals visiting the study website to those proceeding to consent to participate, suggesting a strong interest in the *EndoSMS* intervention. This conversion rate exceeded that of other similar text message intervention trials conducted [45,46], including those conducted in the breast cancer context [43–64 %; 46, 47]. This may reflect a strong need in this population for more comprehensive and holistic support, which goes beyond the physical aspects of the illness [47]. Individuals with endometriosis are generally treated under a single-provider model, with a General Practitioner or Gynaecologist overseeing their care [47,48]. However, this Western biomedical approach, where patients are typically offered hormones or surgery, has left many wanting more comprehensive and holistic options for care. [48]. Approaches like *EndoSMS* that help raise awareness of the range of different options for care may help to address concerns (e.g., psychosocial sequelae) in endometriosis that go beyond infertility and pain.

Like previous text message studies [45,46,49,50], there was a modest dropout of less than 20 %, indicating acceptable feasibility. Importantly, the dropout rate between allocated conditions did not differ, suggesting drop-out was due to natural attrition and not indicative of feasibility concerns. Drop-outs reported having fewer recent treatments for endometriosis, compared with those who completed the study, perhaps reflecting a lower perceived need for support or willingness to reach out for support. Autonomous (or self-directed) motivation [51] and greater intention to change one’s health-related behaviour [52] have been found to predict lower dropout in health-related text message interventions. Some motivational work prior to text message delivery may help individuals determine whether a text message program may meet their needs and improve retention. Only three participants (0.02 %) opted out of the messages — a rate much lower than that found in a similar 3-month text message intervention for breast cancer survivors conducted during the height of the COVID-19 lockdowns [50], where 7 % opted out of the messages. Evaluations of other text message interventions reveal greater text message frequency and text message language complexity are linked with higher opt-out rates, while text messages that explain the importance of topics discussed and provide encouragement have been linked with lower opt-out rates [53]. Thus, the low drop-out rate found for *EndoSMS* may suggest the frequency of text messages and language used was suitable for individuals living with endometriosis, as was found in our initial development process [30]. Additionally, the supportive and encouraging nature of the text messages, as identified in the qualitative results, may have further helped with participant retention. We also found evidence that messages were delivered as intended, with a negligible bounce rate (<0.25 %), supporting the fidelity of *EndoSMS* and the use of text message approaches to successfully deliver a health-related intervention.

4.2. Qualitative Findings

Reflecting the theme of “A shared ‘battle’: Feeling less isolated and alone” many participants indicated the text messages provided support akin to having a friend, who cared about them, serving to reduce their sense of social isolation. This is an important finding as social and emotional loneliness is commonly reported by individuals with endometriosis [8], with the conditions’ high symptom burden making engaging in social activities difficult [54]. Other one-way text message interventions similar to *EndoSMS*, designed for physical illness contexts have also demonstrated that messaging can reduce perceptions of social isolation [34,55]. Recipients of *EndoSMS* indicated that the text

messages validated and normalised their experiences. Feeling invalidated has been identified as a major concern of individuals with endometriosis, particularly in relation to their experiences with health professional consultations [11]. Participants indicated that the text messages helped them to realise it was ok to have 'not so good days' which served to normalize their experience of living with this chronic condition. Relatedly, several participants noted that messages that promoted feelings of being worthy were highly valued. This positively framed messaging is likely helping to counter the tendency for people with endometriosis to be self-critical and have low self-esteem, that is linked with mental health concerns (i.e., depression, anxiety) [56,57].

The qualitative analysis also created that for many participants, the text messages enabled them to adopt a more compassionate or kind perspective towards themselves, and to focus more on treating themselves with care, as reflected in the theme 'Be kind to yourself': A focus on self-care, self-compassion and active coping'. Adopting a more self-compassionate stance is associated with positive physical and mental health outcomes [58,59], including those with endometriosis [60,61] and these responses suggest this messaging was well received by participants. Moreover, participants noted that the positively-framed *EndoSMS* messages improved their mood, an important benefit as many people living with endometriosis experience chronic low mood [3]. Taken together, the potential for *EndoSMS* to enhance mood and encourage a greater focus on self-care may help improve outcomes for individuals with endometriosis, as self-care is an important part of managing any chronic illness [62]. *EndoSMS* also served to bring endometriosis into individuals' awareness and empowered them to manage their condition ('Motivating active coping', e.g., conducting their own research and contacting healthcare professionals), consistent with feedback from a similar text message intervention with breast cancer survivors [49]. Actively seeking information is a way in which individuals living with a chronic condition can have more perceived control [63] and users particularly valued *EndoSMS* messages containing additional information via links to websites, desiring more of these types of messages, as has been found in previous text message intervention evaluation studies. However, although many found the general endometriosis information provided by the text messages to be useful, some had already encountered this information along their endometriosis journey. These mixed responses to receiving information about endometriosis via *EndoSMS* are reflected in the theme 'Mixed perceptions surrounding the provision of general endometriosis information'. This aligns with findings from the broader literature on text message interventions, where users desire more targeted information based on individual stage of disease. As reflected in the theme 'Keeping endometriosis at the forefront: Helpful or stressful?' it appears that some individuals may also prefer to avoid thinking or knowing more about their condition, with messages perhaps serving as an unwanted reminder of their chronic condition [34]. In this instance, *EndoSMS* messaging which provides general self-care advice and focuses on a positive psychology approach (e.g., mindfulness, self-compassion) that broadly encourages acceptance and a proactive approach in managing life's challenges, without explicitly mentioning endometriosis may be a better fit for these individuals [50].

Relatedly, the final theme regarding tailoring reflected a key finding of this analysis regarding need for users to be able to tailor and personalise the content of text messages received. Despite overall positive ratings of the text message content and many finding the text messages relevant, many participants commented that not all messages were well suited to their specific needs. Participants' reports of information being too basic, for example, suggests a need for personalisation and tailoring of message content based on length of illness, with the development of specific content on issues related to longer term living with endometriosis (e.g., side effects of certain treatments, long-term coping strategies) needed. Supporting this, the personalized aspects of the program that were provided (i.e., to preferred name, time of day) were highly rated and have previously been found to enhance

engagement and acceptability [50,64]. Such personalisation may assist individuals to feel comfortable receiving the texts and perhaps facilitated a sense of individualisation, leading them to feeling supported, and that they had a friend "checking in" on them. Further, a need for personalisation of the frequency of text message delivery was also indicated in qualitative feedback, in line with other research where text message users desire an ability to tailor text message frequency [50,65].

4.3. Study limitations

With respect to these findings, some limitations of this research need to be considered. We recruited for this study through one online Australian endometriosis peak body, which may attract individuals who are experiencing the greatest adverse impacts and may therefore not represent all individuals living with this endometriosis [66]. We utilised questions which have been previously adopted to assess the acceptability and feasibility of a supportive text message intervention for women with a physical health condition (breast cancer) [49]. Thus, participants were not asked to give feedback on the seven topics which text messages related to (e.g., physical health, emotional wellbeing). Participants were also not aware of the particular topic areas, as text messages were allocated in a random order and not labelled as coming from a particular topic, to mimic the experience of texting a real person. Future research could explore whether labelling text messages as coming from a particular theme is acceptable to users, as this may enable users to better report on their topic preferences, allowing for greater personalisation. The qualitative feedback was optional, and therefore the responses we reported may not represent the views of all participants, with approximately 40 % of intervention participants providing written feedback. Due to financial and time constraints, these feasibility and acceptability data are based on a pilot, which had 3-month duration delivery of *EndoSMS* - that is, half the intended duration of this intervention. Future investigations assessing the full 6-month delivery of *EndoSMS* are needed to confirm these promising user experience findings.

4.4. Clinical implications

EndoSMS was developed in response to worldwide calls for interventions to ensure continuity of care for individuals with endometriosis [67–69]. As an mHealth intervention, *EndoSMS* is well suited to address gaps in service provision, amid the context of healthcare budgetary constraints [20] and accessibility concerns for those in more remote/rural areas [12]. *EndoSMS* is not designed to replace individualised healthcare, but rather to support individuals along their journey with endometriosis, empowering them to manage their chronic condition. Many of the text messages are designed to support individuals in their interactions with healthcare professionals, and alert them to potentially concerning symptoms (e.g., of poor mental health) and useful resources so they can get further support. By raising awareness of these avenues for additional support, *EndoSMS* may serve as a gateway to further care. The findings of this study support this, with *EndoSMS* encouraging active coping (e.g., doing own research, seeking out specialists) and providing a sense of social support. Clinics or endometriosis consumer organisations (e.g., EndometriosisAustralia, Jean Hailes foundation) may seek to adopt *EndoSMS*, which they could offer as a psychosocial adjunct to care to newly diagnosed patients visiting their practice or signing up to their online consumer interface.

5. Conclusion

In conclusion, this study demonstrated that *EndoSMS* is a feasible and highly acceptable intervention for individuals with endometriosis. Findings indicated that a small number of *EndoSMS* users required greater personalisation to tailor the program to their specific needs for support. Future iterations of the intervention should provide the

opportunity for users to select their preferred topic areas of information and level of support, providing a more tailored approach.

CRedit authorship contribution statement

Kerry A. Sherman: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Melissa J. Pehlivan:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Chantelle Pereira:** Writing – review & editing, Formal analysis. **Alex Hawkey:** Formal analysis, Writing – review & editing, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Anna C. Singleton:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Julie Redfern:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Mike Armour:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Tanya Duckworth:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Donna Ciccia:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Blake Dear:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization. **Michael Cooper:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors have no competing interests to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychores.2024.111929>.

References

- [1] M. Armour, D. Ciccia, A. Yazdani, L. Rombauts, L.V. Niekerk, R. Schubert, et al., Endometriosis research priorities in Australia, *Aust. N. Z. J. Obstet. Gynaecol.* 63 (4) (2023) 594–598, <https://doi.org/10.1111/ajo.13699>.
- [2] M. Armour, J. Sinclair, C.H.M. Ng, M.S. Hyman, K. Lawson, C.A. Smith, et al., Endometriosis and chronic pelvic pain have similar impact on women, but time to diagnosis is decreasing: an Australian survey, *Sci. Rep.* 10 (1) (2020) 16253, <https://doi.org/10.1038/s41598-020-73389-2>.
- [3] C. Sullivan-Myers, K. Sherman, A. Beath, T. Duckworth, M. Cooper, Delineating sociodemographic, medical and quality of life factors associated with psychological distress in individuals with endometriosis, *Hum. Reprod.* (2021), <https://doi.org/10.1093/humrep/deab138>.
- [4] V.L. La Rosa, F. Barra, B. Chiofalo, A. Platania, F. Di Guardo, F. Conway, et al., An overview on the relationship between endometriosis and infertility: the impact on sexuality and psychological well-being, *J. Psychosom. Obstet. Gynaecol.* 41 (2) (2020) 93–97, <https://doi.org/10.1080/0167482x.2019.1659775>.
- [5] M.C.P. Marinho, T.F. Magalhaes, L.F.C. Fernandes, K.L. Augusto, A.V.M. Brilhante, L. Bezerra, Quality of life in women with endometriosis: an integrative review, *J. Womens Health* 27 (3) (2018) 399–408, <https://doi.org/10.1089/jwh.2017.6397>.
- [6] K.E. Nnoaham, L. Hummelshoj, P. Webster, T. d'Hooghe, Nardone F. de Cicco, Nardone C. de Cicco, et al., Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries, *Fertil. Steril.* 96 (2) (2011), <https://doi.org/10.1016/j.fertnstert.2011.05.090>, 366–73.e8.
- [7] R. Roomaney, A. Kagee, Salient aspects of quality of life among women diagnosed with endometriosis: a qualitative study, *J. Health Psychol.* 23 (7) (2018) 905–916, <https://doi.org/10.1177/1359105316643069>.
- [8] C. Calvi, K.A. Sherman, D. Pham, Loneliness and perceived social support in endometriosis: the roles of body image disturbance and anticipated stigma, *Int. J. Behav. Med.* (2023), <https://doi.org/10.1007/s12529-023-10230-w>.
- [9] K. Sayer-Jones, K.A. Sherman, "My body...tends to betray me sometimes": a qualitative analysis of affective and perceptual body image in individuals living with endometriosis, *Int. J. Behav. Med.* 30 (4) (2023) 543–554, <https://doi.org/10.1007/s12529-022-10118-1>.
- [10] N. Handelsman, K.A. Sherman, C. Pereira, M. Fernando, Locked inside: living with uncertainty in self-management for endometriosis during the COVID-19 pandemic, *J. Psychosom. Res.* 170 (2023) 111327, <https://doi.org/10.1016/j.jpsychores.2023.111327>.
- [11] K. Young, J. Fisher, M. Kirkman, Women's experiences of endometriosis: a systematic review and synthesis of qualitative research, *J. Family Plann Reprod Health Care.* 41 (3) (2015) 225–234, <https://doi.org/10.1136/jfprhc-2013-100853>.
- [12] L. Bourke, J.S. Humphreys, J. Wakeman, J. Taylor, Understanding rural and remote health: a framework for analysis in Australia, *Health Place* 18 (3) (2012) 496–503, <https://doi.org/10.1016/j.healthplace.2012.02.009>.
- [13] S.M. Simonsen, C. Stromberg, V. Zoffmann, D. Hartwell, M.L. Olesen, About me as a person not only the disease - piloting guided self-determination in an outpatient endometriosis setting, *Scand. J. Caring Sci.* 34 (4) (2020) 1017–1027, <https://doi.org/10.1111/scs.12810>.
- [14] A. Nygardh, D. Malm, K. Wikby, G. Ahlstrom, The experience of empowerment in the patient-staff encounter: the patient's perspective, *J. Clin. Nurs.* 21 (5–6) (2012) 897–904, <https://doi.org/10.1111/j.1365-2702.2011.03901.x>.
- [15] C. Petersson, A. Nygardh, B. Hedberg, To support self-management for people with long-term conditions - the effect on shared decision-making, empowerment and coping after participating in group-learning sessions, *Nurs. Open* 9 (5) (2022) 2444–2453, <https://doi.org/10.1002/nop.21261>.
- [16] L. Buggio, G. Barbara, F. Facchin, M.P. Frattaruolo, G. Aimi, N. Berlanda, Self-management and psychological-sexological interventions in patients with endometriosis: strategies, outcomes, and integration into clinical care, *Int. J. Womens Health* 9 (2017) 281, <https://doi.org/10.2147/IJWH.S119724>.
- [17] T. Brooks, R. Sharp, S. Evans, J. Baranoff, A. Esterman, Predictors of psychological outcomes and the effectiveness and experience of psychological interventions for adult women with chronic pelvic pain: a scoping review, *J. Pain Res.* 13 (2020) 1081–1102, <https://doi.org/10.2147/JPR.S245723>.
- [18] K. Hansen, B. Brandsborg, U. Kesmodel, A. Forman, M. Kold, R. Pristed, et al., Psychological interventions improve quality of life despite persistent pain in endometriosis: results of a 3-armed randomized controlled trial, *Qual. Life Res.* 32 (6) (2023) 1727–1744.
- [19] A. Dwyer, Neto A. de Almeida, D. Estival, W. Li, C. Lam-Cassetari, M. Antoniou, Suitability of text-based communications for the delivery of psychological therapeutic services to rural and remote communities: scoping review, *JMIR mental health.* 8 (2) (2021) e19478.
- [20] C. Hudson, B. Watson, A. Baker, I. Arsov, in: Australia RBo (Ed.), *The Global Fiscal Response to COVID-19*, 2021.
- [21] L. Beatty, C. Binnion, A systematic review of predictors of, and reasons for, adherence to online psychological interventions, *Int. J. Behav. Med.* 23 (2016) 776–794, <https://doi.org/10.1007/s12529-016-9556-9>.
- [22] A.K. Hall, H. Cole-Lewis, J.M. Bernhardt, Mobile text messaging for health: a systematic review of reviews, *Annu. Rev. Public Health* 36 (2015) 393–415, <https://doi.org/10.1146/annurev-publhealth-031914-122855>.
- [23] S.M. Badawy, L.M. Kuhns, Texting and mobile phone app interventions for improving adherence to preventive behavior in adolescents: a systematic review, *JMIR Mhealth Uhealth* 5 (4) (2017) e6837.
- [24] E.G. Lattie, E.C. Adkins, N. Winquist, C. Stiles-Shields, Q.E. Wafford, A.K. Graham, Digital mental health interventions for depression, anxiety, and enhancement of psychological well-being among college students: systematic review, *J. Med. Internet Res.* 21 (7) (2019) e12869, <https://doi.org/10.2196/12869>.
- [25] A.L. Rathbone, J. Prescott, The use of mobile apps and SMS messaging as physical and mental health interventions: systematic review, *J. Med. Internet Res.* 19 (8) (2017) e295, <https://doi.org/10.2196/jmir.7740>.
- [26] S.R. Partridge, R. Raeside, A. Singleton, K. Hyun, J. Redfern, Effectiveness of text message interventions for weight management in adolescents: systematic review, *JMIR Mhealth Uhealth* 8 (5) (2020) e15849, <https://doi.org/10.2196/15849>.
- [27] A.C. Singleton, R. Raeside, K.K. Hyun, S.R. Partridge, G.L. Di Tanna, N. Hafiz, et al., Electronic health interventions for patients with breast cancer: systematic review and meta-analyses, *J. Clin. Oncol.* 40 (20) (2022) 2257–2270, <https://doi.org/10.1200/JCO.21.01171>.
- [28] J. Jay Miller, J. Lee, C. Niu, E. Grise-Owens, M. Bode, Self-compassion as a predictor of self-care: a study of social work clinicians, *Clin. Soc. Work. J.* 47 (2019) 321–331.
- [29] M. Ferrari, M. Dal Cin, M. Steele, Self-compassion is associated with optimum self-care behaviour, medical outcomes and psychological well-being in a cross-sectional sample of adults with diabetes, *Diabet. Med.* 34 (11) (2017) 1546–1553.
- [30] K.A. Sherman, M.J. Pehlivan, A. Singleton, A. Hawkey, J. Redfern, M. Armour, et al., Co-design and development of EndoSMS, a supportive text message intervention for individuals living with endometriosis: mixed methods study, *JMIR Form Res.* 6 (12) (2022) e40837, <https://doi.org/10.2196/40837>.
- [31] RANZCOG, Australian Clinical Practice Guideline for the Diagnosis and Management of Endometriosis Melbourne, Australia [Available from: <http://ranzocg.edu.au/>], 2021.
- [32] M. Arain, M.J. Campbell, C.L. Cooper, G.A. Lancaster, What is a pilot or feasibility study? A review of current practice and editorial policy, *BMC Med. Res. Methodol.* 10 (2010) 67, <https://doi.org/10.1186/1471-2288-10-67>.
- [33] W. Zhang, Mixed methods application in health intervention research: a multiple case study, *Int J Mult Res Approaches.* 8 (1) (2014) 24–35, <https://doi.org/10.5172/mra.2014.8.1.24>.

- [34] A.C. Singleton, R. Raeside, S.R. Partridge, J. Tat-Ko, S. Che Mun Sum, K.K. Hyun, et al., Supporting breast cancer survivors via text messages: reach, acceptability, and utility of EMPOWER-SMS, *J. Cancer Surviv.* (2021), <https://doi.org/10.1007/s11764-021-01106-7>.
- [35] J. Redfern, A. Thiagalingam, S. Jan, R. Whittaker, M. Hackett, J. Mooney, et al., Development of a set of mobile phone text messages designed for prevention of recurrent cardiovascular events, *Euro J Prevent Cardiol.* 21 (4) (2014) 492–499, <https://doi.org/10.1177/2047487312449416>.
- [36] K.A. Sherman, M.J. Pehlivan, J. Redfern, M. Armour, B. Dear, A. Singleton, et al., A supportive text message intervention for individuals living with endometriosis (EndoSMS): randomized controlled pilot and feasibility trial, *Contemp Clin Trials Commun.* 32 (2023) 101093, <https://doi.org/10.1016/j.conctc.2023.101093>.
- [37] J.S. Holtrop, P.A. Estabrooks, B. Gaglio, S.M. Harden, R.S. Kessler, D.K. King, et al., Understanding and applying the RE-AIM framework: clarifications and resources, *J Clin Transl Sci.* 5 (1) (2021) e126, <https://doi.org/10.1017/cts.2021.789>.
- [38] N. Pearson, P.-J. Naylor, M.C. Ashe, M. Fernandez, S.L. Yoong, L. Wolfenden, Guidance for conducting feasibility and pilot studies for implementation trials, *Pilot Feasibility Stud.* 6 (2020) 1–12, <https://doi.org/10.1186/s40814-020-00634-w>.
- [39] K.D. Neff, Self-compassion: an alternative conceptualization of a healthy attitude toward oneself, *Self Identity* 2 (2) (2003) 85–101, <https://doi.org/10.1080/15298860309032>.
- [40] E. Proctor, H. Silmere, R. Raghavan, P. Hovmand, G. Arons, A. Bunger, et al., Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda, *Adm. Policy Ment. Health* 38 (2) (2011) 65–76, <https://doi.org/10.1007/s10488-010-0319-7>.
- [41] A.S. Davidsen, Phenomenological approaches in psychology and health sciences, *Qual. Res. Psychol.* 10 (3) (2013) 318–339, <https://doi.org/10.1080/14780887.2011.608466>.
- [42] J. Brooks, S. McCluskey, E. Turley, N. King, The utility of template analysis in qualitative psychology research, *Qual. Res. Psychol.* 12 (2) (2015) 202–222, <https://doi.org/10.1080/14780887.2014.955224>.
- [43] M.E. Kiger, L. Varpio, Thematic analysis of qualitative data: AMEE Guide No. 131, *Med Teacher.* 42 (8) (2020) 846–854, <https://doi.org/10.1080/0142159x.2020.1755030>.
- [44] B. McMullen, K. Duncanson, D. Schmidt, C. Collins, L. MacDonald-Wicks, A critical realist exploration of factors influencing engagement in diabetes prevention programs in rural settings, *Aust. J. Prim. Health* 29 (5) (2023) 510–519, <https://doi.org/10.1071/PY22256>.
- [45] F.J. Schwebel, M.E. Larimer, Text message reminders as an adjunct to a substance use intervention for adolescents and young adults: pilot feasibility and acceptability findings, *Digit Health.* 6 (2020), <https://doi.org/10.1177/2055207620965052>, 2055207620965052.
- [46] L.A. Schwartz, L.C. Daniel, D. Henry-Moss, C.P. Bonafide, Y. Li, A.M. Psihogios, et al., Feasibility and acceptability of a pilot tailored text messaging intervention for adolescents and young adults completing cancer treatment, *Psycho-Oncol.* 29 (1) (2020) 164–172, <https://doi.org/10.1002/pon.5287>.
- [47] C. Pickett, W.G. Foster, S.K. Agarwal, Current endometriosis care and opportunities for improvement, *Reprod Fertil.* 4 (3) (2023), <https://doi.org/10.1530/raf-22-0091>.
- [48] M. Armour, J. Avery, M. Leonardi, L. Van Niekerk, M.L. Druitt, M.A. Parker, et al., Lessons from implementing the Australian national action plan for endometriosis, *Reproduction and Fertility.* 3 (3) (2022) C29–C39.
- [49] A. Singleton, R. Raeside, S.R. Partridge, J. Tat-Ko, S. Che Mun Sum, K.K. Hyun, et al., Supporting breast cancer survivors via text messages: reach, acceptability, and utility of EMPOWER-SMS, *J. Cancer Surviv.* (2021), <https://doi.org/10.1007/s11764-021-01106-7>.
- [50] A.C. Singleton, R. Raeside, K.K. Hyun, M. Hayes, K.A. Sherman, E. Elder, et al., A national health and wellness SMS text message program for breast cancer survivors during COVID-19 (EMPOWER-SMS COVID-19): mixed methods evaluation using the RE-AIM framework, *J. Med. Internet Res.* 25 (2023) e45164, <https://doi.org/10.2196/45164>.
- [51] K. Coa, H. Patrick, Baseline motivation type as a predictor of dropout in a healthy eating text messaging program, *JMIR Mhealth Uhealth* 4 (3) (2016) e5992.
- [52] K.P. Wiseman, K.I. Coa, Y.M. Prutzman, Predictors of retention in an adult text messaging smoking cessation intervention program: cohort study, *JMIR Mhealth Uhealth* 7 (8) (2019) e13712.
- [53] H. Fricke, D. Kalogrides, S. Loeb, It's too annoying: who drops out of educational text messaging programs and why, *Econ. Lett.* 173 (2018) 39–43.
- [54] J.M. Cole, S. Grogan, E. Turley, "The most lonely condition I can imagine": psychosocial impacts of endometriosis on women's identity, *Fem. Psychol.* 31 (2) (2021) 171–191.
- [55] A.M. González-Echevarría, E. Rosario, S. Acevedo, I. Flores, Impact of coping strategies on quality of life of adolescents and young women with endometriosis, *J. Psychosom. Obstet. Gynaecol.* 40 (2) (2019) 138–145, <https://doi.org/10.1080/0167482x.2018.1450384>.
- [56] S. Geller, S. Levy, S. Ashkeloni, B. Roeh, E. Sbiet, R. Avitsur, Predictors of psychological distress in women with endometriosis: the role of multimorbidity, body image, and self-criticism, *Int. J. Environ. Res. Public Health* 18 (7) (2021) 3453.
- [57] M.J. Pehlivan, K.A. Sherman, V. Wuthrich, M. Horn, M. Basson, T. Duckworth, Body image and depression in endometriosis: examining self-esteem and rumination as mediators, *Body Image* 43 (2022) 463–473.
- [58] W.J. Phillips, D.W. Hine, Self-compassion, physical health, and health behaviour: a meta-analysis, *Health Psychol. Rev.* 15 (1) (2021) 113–139.
- [59] M. Ferrari, C. Hunt, A. Harrysunker, M. Abbott, A. Beath, D. Einstein, Self-compassion interventions and psychosocial outcomes: a meta-analysis of RCTs, *Mindfulness* 10 (8) (2019) 1455–1473, <https://doi.org/10.1007/s12671-019-01134-6>.
- [60] C. Dowding, A. Mikocka-Walus, D. Skvarc, M. O'Shea, L. Olive, S. Evans, Learning to cope with the reality of endometriosis: a mixed-methods analysis of psychological therapy in women with endometriosis, *Br. J. Health Psychol.* 29 (3) (2024) 644–661.
- [61] C.M. Skinner, R.G. Kuijer, Self-compassion and health-related quality of life in individuals with endometriosis, *Psychol. Health* 1-18 (2024).
- [62] B. Riegel, T. Jaarsma, C.S. Lee, A. Strömberg, Integrating symptoms into the middle-range theory of self-care of chronic illness, *Adv. Nurs. Sci.* 42 (3) (2019) 206–215.
- [63] S. Schieman, G. Plickert, How knowledge is power: education and the sense of control, *Soc. Forces* 87 (1) (2008) 153–183.
- [64] J. Redfern, K. Santo, G. Coorey, J. Thakkar, M. Hackett, A. Thiagalingam, et al., Factors influencing engagement, perceived usefulness and behavioral mechanisms associated with a text message support program, *PLoS One* 11 (10) (2016) e0163929, <https://doi.org/10.1371/journal.pone.0163929>.
- [65] A. Budenz, K. Coa, E. Grenen, B. Keefe, A. Sanders, K.P. Wiseman, et al., User experiences with an SMS text messaging program for smoking cessation: qualitative study, *JMIR Form Res.* 6 (3) (2022) e32342, <https://doi.org/10.2196/32342>.
- [66] A. De Graaff, C. Dirksen, S. Simoens, B. De Bie, L. Hummelshoj, T. D'Hooghe, et al., Quality of life outcomes in women with endometriosis are highly influenced by recruitment strategies, *Hum. Reprod.* 30 (6) (2015) 1331–1341, <https://doi.org/10.1093/humrep/dev084>.
- [67] L. Van Niekerk, B. Weaver-Pirie, M. Matthewson, Psychological interventions for endometriosis-related symptoms: a systematic review with narrative data synthesis, *Arch. Womens Ment. Health* 22 (6) (2019) 723–735, <https://doi.org/10.1007/s00737-019-00972-6>.
- [68] N.P. Johnson, L. Hummelshoj, W.E.S.M. Consortium, M. Abrao, G. Adamson, C. Allaire, et al., Consensus on current management of endometriosis, *Human Reprod.* 28 (6) (2013) 1552–1568.
- [69] L. Kuznetsov, K. Dworzynski, M. Davies, C. Overton, Diagnosis and management of endometriosis: summary of NICE guidance, *Br. Med. J.* 358 (2017).