

Understanding Dropout from Guided Internet-Based Cognitive Behavioral Therapy for Endometriosis: A Mixed-Methods Study

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Abstract

Background

Internet-based cognitive behavioral therapy (iCBT) has demonstrated efficacy across a range of mental health and chronic somatic conditions. However, treatment dropout remains a common challenge, and the factors contributing to premature discontinuation are not yet fully understood. Research examining dropout from iCBT for endometriosis is particularly limited. Therefore, the present study pursued two main objectives: (1) to examine whether demographic, medical, and psychological characteristics were associated with dropout from a guided iCBT intervention for endometriosis (Ed.iTh), and (2) to explore participants' subjective reasons for treatment discontinuation.

Methods

This mixed-methods study was conducted in the context of a randomized controlled trial evaluating the Ed.iTh intervention. Quantitative analyses included 149 participants, of whom 95 completed the intervention and 54 discontinued before completing all eight modules. Baseline characteristics were compared between completers and dropouts using Welch's analyses of variance, chi-squared tests, and Fisher's exact tests, as appropriate. Factors associated with dropout were further examined using multiple binary logistic regression with data-driven predictor selection. In addition, semi-structured interviews were conducted with ten participants who had discontinued the intervention. Interview data were analyzed using content-structuring qualitative content analysis according to Kuckartz and Rädiker [1], combining deductive and inductive category development.

Results

The overall dropout rate was 36.2%. Baseline comparisons revealed no significant differences between dropouts and completers in demographic, medical, or psychological characteristics, except for painkiller use, which was more frequent among completers. In the final logistic regression model, painkiller use was associated with lower odds of dropout ($OR = 0.41$, 95% CI $[0.20, 0.81]$, $p = .012$), whereas time since laparoscopy was not significantly associated with dropout. Qualitative analysis resulted in five overarching themes reflecting reasons for dropout or barriers to continued participation: time-related barriers, technical and usability barriers, intervention design and implementation, perceived lack of relevance, and emotional difficulties.

Conclusions

Quantitative baseline characteristics provided limited insight into treatment dropout, whereas qualitative findings highlighted individual, contextual, and intervention-related barriers to continued participation.

Increasing flexibility, optimizing platform usability, aligning intervention design with participants' needs and expectations, and considering the emotional demands of treatment may help improve engagement and retention in guided iCBT interventions for endometriosis.

Background

Endometriosis is a highly prevalent gynecological condition, affecting between 5% and 15% of individuals with a uterus of reproductive age [2]. It is characterized by a range of clinical symptoms, including menstrual irregularities, chronic pelvic pain, dysmenorrhea, dyspareunia, and infertility [3]. These symptoms can result in substantial psychological and functional impairments. Individuals with endometriosis frequently report reduced quality of life, including sexual dysfunction, increased stress, decreased activity levels, and poor sleep [4–6]. The condition can also negatively affect work performance, social participation, and intimate relationships [4–6]. Compared with the general population [7–9], individuals with endometriosis experience higher levels of anxiety, depression, and other psychiatric disorders. In addition, endometriosis imposes a considerable economic burden through increased healthcare costs and productivity losses [10].

Despite its chronic and multifaceted nature, treatment for endometriosis remains largely symptom-focused, with pain relief as the primary goal [11]. Standard treatment approaches include hormonal therapies, analgesic medications, and surgery [12, 13]. However, medical interventions alone may be insufficient, as pain and psychological symptoms often persist, highlighting the need for complementary mental health interventions [6, 14]. Psychological interventions may address these challenges by modifying pain perception and enhancing coping strategies [15–17]. Endometriosis is commonly conceptualized as a chronic pain condition, as persistent pelvic pain and dysmenorrhea are among its most prominent and debilitating symptoms [3]. Similar to other chronic pain disorders, endometriosis-related pain is associated with psychological distress, impaired daily functioning, reduced quality of life, and altered pain processing mechanisms [4, 14]. Consequently, treatment approaches that have proven effective in chronic pain populations may also be relevant for individuals with endometriosis. Cognitive behavioral therapy (CBT) is currently the most widely used psychological treatment for chronic pain [16, 18, 19] and has also demonstrated efficacy in women's health conditions such as premenstrual dysphoric disorder (PMDD) [20]. Initial findings suggest that CBT may also benefit individuals with endometriosis by improving psychological well-being and emotion regulation, and by reducing symptoms of depression, anxiety and stress [14, 21].

Despite its potential benefits, the utilization of CBT among individuals with endometriosis remains limited. This may be attributable to financial, environmental and healthcare system barriers, including delayed diagnosis [22], delayed referrals and insufficient treatment capacity [23]. In addition, patient-level factors may hinder engagement with psychological treatment. Individuals with endometriosis may become trapped in a cycle of pessimistic worries, hypervigilance to pain and feelings of anxiety, hopelessness, and shame, all of which can discourage participation in psychotherapy [5, 6]. Limited awareness of psychotherapy as a treatment option may further reduce engagement, as can stigma

surrounding psychological care [24, 25]. Furthermore, some individuals may believe that pain can only be alleviated through medical interventions, reflecting broader biomedical illness beliefs that may reduce openness to psychological approaches [26].

To address some of these barriers, internet-based cognitive behavioral therapy (iCBT) has emerged as a practical and accessible treatment option [27]. By leveraging the widespread use of digital technologies, iCBT can overcome geographic and time barriers [28], increase flexibility [29], and provide a confidential platform for individuals who are reluctant to seek face-to-face care. Evidence suggests that iCBT is as effective as traditional face-to-face CBT for a range of mental health and chronic somatic (pain) conditions [30–32] and outperforms passive control conditions such as waitlists or treatment as usual [33, 34]. By delivering scalable, evidence-based care, iCBT may help reduce pressure on overburdened mental health services [35].

Despite these advantages, iCBT presents distinct challenges, including limited non-verbal communication, reduced opportunities for trust building, technical difficulties [36, 37] and concerns regarding privacy and data security [38]. These challenges may not only hinder treatment progress but may also contribute to treatment dropout [37]. Dropout, defined as leaving treatment before its completion [39], is considered one of the primary challenges associated with iCBT [40] with reported dropout rates ranging from 28.6% [14] to 45.3% [40]. Treatment completion rates tend to be lower in iCBT than in face-to-face CBT, with systematic reviews reporting that between one-third and one-half of participants discontinue treatment prematurely [41, 42]. Understanding dropout in iCBT is therefore essential for evaluating intervention effectiveness, as premature discontinuation can compromise long-term outcomes [43].

Although dropout rates in iCBT have been widely examined, fewer studies have investigated factors associated with dropout [40], and most research has relied on quantitative methods [44]. Findings regarding demographic characteristics, such as age, gender, and education, have been inconsistent or weak [40, 45, 46]. In contrast, some individual-level factors, including low motivation [47], low social support [48] and lower extraversion [40], have been associated with an increased likelihood of dropout. Qualitative studies provide further insight into patients' reasons for discontinuing treatment, highlighting technical difficulties, time constraints, declining motivation, dissatisfaction with the therapist or therapeutic alliance, and perceptions that the intervention content lacks personal relevance [49–51]. In addition, Lawler et al. [52] identified a mismatch between patients' expectations and their actual treatment experiences as a potential contributor to dropout.

Despite these advances, few studies have combined quantitative and qualitative approaches to examine both who disengages from treatment and why. Moreover, to our knowledge, these factors have not yet been investigated among individuals with endometriosis participating in iCBT. Given the complexity of endometriosis and unique barriers to psychological care, such as fear of stigmatization and skepticism stemming from biomedical illness beliefs, a better understanding of treatment engagement and factors contributing to dropout in this population is needed. We recently conducted a randomized controlled trial

(RCT) evaluating “Ed.iTh”, a therapist-guided iCBT program developed to improve health-related quality of life in individuals with endometriosis [53]. As the first therapist-guided iCBT intervention specifically developed for this population, Ed.iTh provides a unique opportunity to examine factors associated with dropout as well as participants’ reasons for treatment discontinuation.

Objectives

Using a mixed-methods design, this study aims to investigate (1) whether demographic, medical, or psychological characteristics are associated with treatment dropout, and (2) which subjective barriers and contextual factors contribute to treatment discontinuation. By integrating quantitative analysis with in-depth qualitative interviews, the study seeks to provide a comprehensive understanding of dropout and to inform future efforts to enhance engagement in digital interventions for individuals with endometriosis.

Methods

Sample and Study Procedure

All participants ($N = 163$) included in the Ed.iTh study were principally eligible for the present study. The inclusion criteria of the Ed.iTh study were: (1) endometriosis diagnosed through laparoscopic surgery; (2) age between 18 and 45 years; (3) reduced health-related quality of life (HRQoL), assessed using the Endometriosis Health Profile-30 (EHP-30) and its modular section; (4) sufficient German language skills; and (5) access to an appropriate technical device (PC or laptop) with a stable internet connection. For details on the exclusion criteria, please refer to the study protocol [54].

Of the 163 participants, 82 were randomized to the treatment group (TG) and 81 to the waiting-list control group (WG). For the present dropout analyses, participants were included if they had started the Ed.iTh intervention and information on intervention completion status was available. The resulting quantitative analysis sample comprised $N = 149$ participants. Of these, 95 participants completed all eight modules, whereas 54 participants discontinued the intervention after completing between one and seven modules, corresponding to a dropout rate of 36.2%. Participants were included irrespective of their original allocation to the TG or WG. The present mixed-methods study comprised two complementary components. First, quantitative analyses were conducted using baseline demographic, medical, and psychological data from the $N = 149$ participants described above. Participants were classified as either completers ($n = 95$) or dropouts ($n = 54$). Second, qualitative interviews were conducted with a subsample of participants who had discontinued the intervention. All participants who had dropped out by November 10, 2023 ($n = 29$) were invited via email to participate in an interview, of whom ten agreed and were subsequently interviewed. Eligibility for the qualitative interviews required written informed consent and completion of at least one but fewer than all eight intervention modules. Completion of at least one module ensured sufficient familiarity with the intervention content and structure to reflect on

potential barriers to participation. The participant flow and composition of the quantitative and qualitative study samples are shown in Fig. 1.

iCBT Intervention

The Ed.iTh program is a guided iCBT intervention designed to enhance quality of life of individuals with endometriosis. The intervention consists of eight modules. Participants were advised to complete one module per week. The modules focus on psychoeducation, goal setting and cognitive restructuring and provide strategies for dealing with acute pain, stress management and emotion regulation. A psychologist provided weekly therapeutic support, offering written feedback on module content, answering questions, and encouraging continued engagement. All psychologists involved held at least a bachelor's degree in psychology. For further details on the intervention, please refer to the study protocol [54].

Measures

Demographic, medical, and psychological characteristics assessed at baseline were considered as potential factors associated with treatment dropout. These included age, time since laparoscopy, painkiller use, hormonal contraceptive use, prior psychotherapy, menstruation status, endometriosis-related quality of life, and depressive symptoms.

Endometriosis-related Quality of Life (QoL). QoL was assessed using the German version [55] of the EHP-30 [5]. The questionnaire measures endometriosis-related burden across multiple domains, including pain, control and powerlessness, social support, emotional well-being and self-image. The EHP-30 comprises a 30-item core questionnaire and a 23-item modular section. Only the core questionnaire was used in the present analyses, as it captures dimensions relevant across individuals with endometriosis. Items are rated on a 5-point Likert scale (0–4), with lower scores indicating better quality of life. The EHP-30 is the most extensively validated disease-specific QoL instrument for endometriosis [56, 57]. Cronbach's α ranged from .75 to .97 across subscales in prior research [57]. In the current sample, Cronbach's α ranged from .80 to .92 across the five core subscales.

Depressive symptoms. The severity of depression was assessed using the 21-item Beck Depression Inventory (BDI-II, Beck et al. [58]). Participants rated each item based on how they had felt over the past two weeks, including the day of assessment, using a 4-point scale (0–3). A total score was calculated by summing all item scores, with higher scores indicating greater symptom severity. Cronbach's α was .80 in a previous study [59] and .89 in the current sample.

Dropout. Dropout was defined as discontinuing the Ed.iTh intervention after completing at least one but fewer than all eight modules. Participants who completed all eight modules were classified as completers. Accordingly, dropout was operationalized as a binary outcome for the main quantitative analyses (0 = completion, 1 = dropout).

Semi-structured Interview

Semi-structured interviews exploring reasons for dropout were conducted between September and December 2023 via the online platform RED medical. Interviews lasted between 25 and 47 minutes ($M = 37$ minutes), depending on the extent to which participants elaborated on their experiences with the intervention and reasons for discontinuation. All interviews were conducted by J.G., who held a bachelor's degree in psychology at the time and had been actively involved in the Ed.iTh project for more than one year. Data protection was ensured through end-to-end encryption. Interviews were audio-recorded using an external recording device, transcribed verbatim, and subsequently proofread by the interviewer. Participants received a €15 gift voucher for taking part in the interview. In addition, a €50 gift voucher was raffled among all interview participants at the end of the study.

The semi-structured interview guide was adapted from the previously published interview schedule by Lawler et al. [52]. The original interview schedule was translated into German and adapted to the context of endometriosis and the Ed.iTh intervention. Permission to translate and adapt the interview schedule was obtained from the authors on May 11, 2023. The four overarching domains of the original interview schedule were retained, while individual questions were modified and additional questions were included to address intervention- and endometriosis-specific aspects. The adapted interview guide covered four broad areas: (1) experiences with technology (e.g., "Were there any technical or symptom-related difficulties?"), (2) motivation to engage in treatment (e.g., "Can you tell me a bit about what motivated you to take part in the training at the beginning?"), (3) experiences with the intervention content (e.g., "Did you feel that the content of the training was relevant to you?"), and (4) experiences with the accompanying psychologist (e.g., "How did it feel to communicate with her via the platform?"). The complete English-language version of the adapted interview guide is provided as Supplementary File 1.

Statistical Analysis

Quantitative analyses were conducted using R [60]. Descriptive statistics were calculated separately for completers, dropouts who participated in the qualitative interviews, and dropouts who did not participate in an interview to characterize the study sample and the qualitative subsample. Exploratory subgroup analyses were conducted to examine whether interview participants differed systematically from dropouts who did not participate in an interview. No significant differences in the examined baseline characteristics were observed between the two dropout subgroups (all $p > .05$). For the main quantitative analyses, all participants meeting the dropout definition were analyzed as a single dropout group ($n = 54$). Differences between completers ($n = 95$) and dropouts ($n = 54$) in demographic, medical, and psychological baseline characteristics were examined using Welch's analyses of variance for continuous variables and chi-squared tests for categorical variables. Fisher's exact tests were used when expected cell frequencies were insufficient for chi-squared testing.

To explore factors associated with treatment dropout, a multiple binary logistic regression analysis with data-driven predictor selection was conducted, with dropout coded as 1 and completion as 0. Candidate

predictors were initially screened for suitability based on data availability, cell frequencies, separation, and model assumptions. The initial multivariable model included age, depressive symptoms (BDI-II), endometriosis-related quality of life (EHP-30), time since laparoscopy, painkiller use, hormonal contraceptive use, prior psychotherapy, and menstruation status. A parsimonious model was subsequently derived using stepwise selection based on the Akaike information criterion (AIC). Model assumptions and fit were assessed using multicollinearity diagnostics, Cook's distance, the Hosmer–Lemeshow goodness-of-fit test, and Nagelkerke's R^2 . Associations are reported as odds ratios (ORs) with 95% confidence intervals (CIs) and p values.

Qualitative Data Analysis

The interviews were analyzed using content-structuring qualitative content analysis according to Kuckartz and Rädiker [1]. The analysis combined deductive and inductive category development. Initial main categories were derived from the interview guide, while subcategories were developed inductively from the interview material and refined throughout the coding process. Interview transcripts were initially coded independently by J.G. and a trained research assistant using MAXQDA 2022 [61]. During the coding process, the category system was iteratively reviewed and refined. Where necessary, categories were differentiated or reorganized to more accurately reflect the interview material. Coding discrepancies and the final category system were discussed and resolved through consensus. The resulting category system comprised five overarching themes and their respective subthemes.

Results

Quantitative findings

In total, 54 of 149 participants (36.2%) dropped out of the Ed.iTh intervention, whereas 95 participants (63.8%) completed all eight modules. Of the 54 participants who dropped out, ten participated in the qualitative interviews and 44 did not. Exploratory subgroup analyses revealed no significant differences in demographic, medical, or psychological baseline characteristics between dropouts who participated in an interview and those who did not (all $p > .05$; see Table 1). For the main quantitative analyses, all participants meeting the dropout definition were analyzed as a single dropout group ($n = 54$). Baseline comparisons between participants who dropped out ($n = 54$) and those who completed the intervention ($n = 95$) revealed no significant differences in the examined demographic, medical, or psychological characteristics, except for painkiller use. A smaller proportion of participants in the dropout group (23 of 54, 42.6%) reported using painkillers compared with the completion group (59 of 95, 62.1%), $\chi^2(1, N = 149) = 4.54, p = .033$ (see Table 2).

Table 1
Baseline characteristics of dropout subgroups and completers

Baseline Characteristics	Dropout + interview (n = 10)	Dropout, no interview (n = 44)	Completion (n = 95)	p ^a (interview vs. no interview)
Demographic characteristics				
Age, years, M (SD)	29.50 (7.26)	30.80 (6.59)	30.90 (5.66)	.607
Family status, n (%)				.544
Single	1 (10.0)	12 (27.3)	25 (26.3)	
Stable relationship	5 (50.0)	21 (47.7)	48 (50.5)	
Married/registered Partnership	4 (40.0)	10 (22.7)	21 (22.1)	
Divorced,	0 (0.0)	1 (2.3)	1 (1.1)	
Highest level of education, n (%)				.064
Secondary school	1 (10.0)	0 (0.0)	3 (3.2)	
Further education	0 (0.0)	8 (18.2)	18 (18.9)	
Vocational training	1 (10.0)	14 (31.8)	18 (18.9)	
University degree	8 (80.0)	21 (47.7)	54 (56.8)	
Doctoral degree	0 (0.0)	1 (2.3)	2 (2.1)	
Employment status, n (%)				.717
Student	1 (10.0)	9 (20.5)	16 (16.8)	
Apprentice	1 (10.0)	1 (2.3)	2 (2.1)	
Employed	7 (70.0)	27 (61.4)	65 (68.4)	
Self-employed	0 (0.0)	1 (2.3)	4 (4.2)	
Unemployed	0 (0.0)	1 (2.3)	0 (0.0)	
Other	1 (10.0)	5 (11.4)	8 (8.4)	
Note. Values are presented as <i>M (SD)</i> for continuous variables and <i>n (%)</i> for categorical variables. EHP-30 = Endometriosis Health Profile-30; BDI-II = Beck Depression Inventory-II.				

Baseline Characteristics	Dropout + interview (n = 10)	Dropout, no interview (n = 44)	Completion (n = 95)	p ^a (interview vs. no interview)
Number of children, n (%)				1.000
0	9 (90.0)	38 (86.4)	81 (85.3)	
1	1 (10.0)	4 (9.1)	7 (7.4)	
2	0 (0.0)	2 (4.5)	7 (7.4)	
Medical characteristics				
Hormonal contraceptive use, n (%)	6 (60.0)	36 (81.8)	68 (71.6)	.203
Antidepressant use, n (%)	1 (10.0)	0 (0.0)	4 (4.2)	.185
Painkiller use, n (%)	4 (40.0)	19 (43.2)	59 (62.1)	1.000
Menstruating, n (%)	5 (50.0)	25 (56.8)	53 (55.8)	.736
Pain during menstruation, M (SD) (1–10)	7.80 (1.30)	6.96 (2.26)	6.64 (1.92)	.283
Time since laparoscopy, months, M (SD)	60.30 (56.90)	43.60 (35.30)	39.20 (34.60)	.395
EHP-30, M (SD)	47.00 (19.70)	50.60 (19.70)	48.00 (17.50)	.618
Surgical removal, n (%)	10 (100.0)	43 (97.7)	90 (94.7)	1.000
Psychological characteristics				
BDI-II, M (SD)	20.10 (14.00)	18.80 (12.60)	18.10 (9.55)	.784
Prior psychotherapy, n (%)	2 (20.0)	13 (29.5)	34 (35.8)	.708
Note. Values are presented as <i>M (SD)</i> for continuous variables and <i>n (%)</i> for categorical variables. EHP-30 = Endometriosis Health Profile-30; BDI-II = Beck Depression Inventory-II.				

✂ *p* values refer exclusively to exploratory comparisons between dropouts who participated in the qualitative interviews (*n* = 10) and dropouts who did not participate (*n* = 44). Welch's tests were used for continuous variables and Fisher's exact tests for categorical variables.

Table 2
Baseline characteristics of participants who dropped out and completed the intervention

Baseline Characteristics	Dropout (n = 54)	Completion (n = 95)	p
Demographic characteristics			
Age, years, M (SD)	30.60 (6.67)	30.90 (5.66)	.774
Family status, n (%)			.932
Single	13 (24.1)	25 (26.3)	
Stable relationship	26 (48.1)	48 (50.5)	
Married/registered Partnership	14 (25.9)	21 (22.1)	
Divorced,	1 (1.9)	1 (1.1)	
Highest level of education, n (%)			.799
Secondary school	1 (1.9)	3 (3.2)	
Further education	8 (14.8)	18 (18.9)	
Vocational training	15 (27.8)	18 (18.9)	
University degree	29 (53.7)	54 (56.8)	
Doctoral degree	1 (1.9)	2 (2.1)	
Employment status, n (%)			.721
Student	10 (18.5)	16 (16.8)	
Apprentice	2 (3.7)	2 (2.1)	
Employed	34 (63.0)	65 (68.4)	
Self-employed	1 (1.9)	4 (4.2)	
Unemployed	1 (1.9)	0 (0.0)	
Other	6 (11.1)	8 (8.4)	
Number of children, n (%)			.664
Note. Values are presented as M (SD) for continuous variables and n (%) for categorical variables. p values refer to comparisons between the dropout and completion groups. Welch's tests were used for continuous variables. Chi-squared tests or Fisher's exact tests were used for categorical variables, as appropriate. EHP-30 = Endometriosis Health Profile-30; BDI-II = Beck Depression Inventory-II.			

Baseline Characteristics	Dropout (n = 54)	Completion (n = 95)	p
0	47 (87.0)	81 (85.3)	
1	5 (9.3)	7 (7.4)	
2	2 (3.7)	7 (7.4)	
Medical characteristics			
Hormonal contraceptive use, n (%)	42 (77.8)	68 (71.6)	.526
Antidepressant use, n (%)	1 (1.9)	4 (4.2)	.654
Painkiller use, n (%)	23 (42.6)	59 (62.1)	.033*
Menstruating, n (%)	30 (55.6)	53 (55.8)	1.000
Pain during menstruation, M (SD) (1–10)	7.10 (2.14)	6.64 (1.92)	.335
Time since laparoscopy, months, M (SD)	46.70 (40.10)	39.20 (34.60)	.253
EHP-30, M (SD)	49.90 (19.60)	48.00 (17.50)	.556
Surgical removal, n (%)	53 (98.1)	90 (94.7)	.418
Psychological characteristics			
BDI-II, M (SD)	19.00 (12.70)	18.10 (9.55)	.662
Prior psychotherapy, n (%)	15 (27.8)	34 (35.8)	.413
Note. Values are presented as M (SD) for continuous variables and n (%) for categorical variables. p values refer to comparisons between the dropout and completion groups. Welch's tests were used for continuous variables. Chi-squared tests or Fisher's exact tests were used for categorical variables, as appropriate. EHP-30 = Endometriosis Health Profile-30; BDI-II = Beck Depression Inventory-II.			

* $p < .05$.

An exploratory multiple binary logistic regression with data-driven predictor selection was conducted to examine factors associated with treatment dropout. Following stepwise AIC-based model selection, the final parsimonious model retained time since laparoscopy and painkiller use. The final model provided a significantly better fit than the intercept-only model ($p = .019$) and showed adequate model fit (Hosmer–Lemeshow test, $p = .835$; Nagelkerke $R^2 = .071$). Painkiller use was significantly associated with lower odds of dropout (OR = 0.41, 95% CI [0.20, 0.81], $p = .012$), whereas time since laparoscopy was not significantly associated with dropout (OR = 1.01, 95% CI [0.998, 1.02], $p = .107$). Thus, painkiller use was the only variable significantly associated with treatment dropout in the final model.

Qualitative content analysis

The interviewed participants had a mean age of 29.5 years ($SD = 7.3$ years) and had been diagnosed with endometriosis an average of five years prior ($SD = 4.8$ years). They reported substantial disease impact on the EHP-30 ($M = 47.1$, $SD = 19.7$) and their average BDI-II score ($M = 20.1$, $SD = 14.0$) indicated moderate depression. Following the content-structuring qualitative content analysis by Kuckartz and Rädiker [1], the interview material was systematically coded using a combination of deductive and inductive category development. Main categories were initially derived from the interview guide, while subcategories were inductively developed and refined based on the interview material. Through this iterative coding process, five central themes reflecting reasons for dropout or barriers to participation were identified: (1) lack of time, (2) technical difficulties, (3) unmet expectations, (4) content irrelevance, and (5) emotional difficulties. Subthemes identified within each of these overarching themes and exemplary quotes are outlined in Table 3.

Category 1: Time-related barriers

Time-related barriers represented a prominent reason for dropout. Participants described difficulties integrating the intervention into their everyday lives and finding sufficient time to complete the modules. This category comprised five subthemes: lack of flexibility, private circumstances, occupational circumstances, lack of integration into daily life, and vacation.

Participants described the predefined timeframe for completing modules as insufficiently flexible and reported difficulties fitting the intervention into weeks with varying demands. Private circumstances, such as bereavement and other personal responsibilities, sometimes required participants to prioritize other aspects of their lives over the intervention. Similarly, occupational circumstances, including high workloads and professional commitments, limited the time available for participation. Participants also described difficulties integrating the intervention and the strategies learned into their daily routines. Finally, vacations interfered with participation, particularly when participants did not have access to a laptop or were unable to use the intervention adequately on a mobile device.

Category 2: Technical and usability barriers

Technical and usability barriers comprised difficulties participants encountered when accessing or using the intervention platform. Four subthemes were identified: problems logging in, poor mobile usability, entries not being saved, and reminder e-mails being directed to the spam folder.

Participants repeatedly reported problems accessing the platform, including unsuccessful login attempts and links that did not work across different devices. The platform was also perceived as insufficiently optimized for mobile use, making it more difficult to complete the intervention without access to a computer. Further technical problems occurred when participants' entries were not saved, resulting in the loss of previously completed work and frustration. In addition, some participants reported that reminder e-mails were automatically directed to their spam folders, reducing the salience of the intervention in everyday life and making it easier to forget upcoming modules.

Category 3: Intervention design and implementation

The third category comprised aspects related to the design and implementation of the intervention that participants perceived as barriers to continued participation. Four subthemes were identified: intensity of contact with the psychologist, unexpectedly high time investment, unexpected training design, and criticism of the intervention framework.

Some participants had expected more intensive and personal interaction with the accompanying psychologist. Although weekly written feedback was provided, participants described a desire for closer interaction and more opportunities for direct communication. Participants also reported that the intervention required more time than they had anticipated. In particular, engaging with emotionally demanding topics and reflecting extensively on their thoughts and feelings increased the time required to complete the modules. In addition, the design of the intervention differed from some participants' initial expectations. For example, some had expected an intervention primarily consisting of questionnaires and rating scales and were surprised by the large number of open-ended questions and the amount of written self-reflection required. Participants also criticized aspects of the intervention framework, particularly the timing and spacing of modules. Some would have preferred longer intervals between modules to allow more time to practice and integrate newly learned strategies before proceeding to the next topic.

Category 4: Perceived lack of relevance

The fourth category captured participants' perceptions that parts of the intervention were not sufficiently relevant to their individual situation or current needs. Three subthemes were identified: topics no longer relevant, missing contents, and lack of identification with intervention content.

For some participants, the relevance of the intervention had changed by the time they started the program. This was particularly apparent among participants who had initially been allocated to the waiting-list condition and whose needs or circumstances had changed during the waiting period. Participants also reported that topics they considered personally important, such as fertility, were not sufficiently addressed by the intervention. Furthermore, some participants had difficulties identifying with specific intervention content. For example, participants who experienced little pain found it difficult to relate to exercises that focused strongly on pain-related experiences. Others had already developed strategies for managing their symptoms independently, which reduced the perceived relevance of some intervention components.

Category 5: Emotional difficulties

The final category comprised emotional and symptom-related difficulties experienced while participating in the intervention. Four subthemes were identified: physical exhaustion, mental exhaustion, personal problems being stirred up, and frustration.

Participants described physical exhaustion related to endometriosis symptoms as a barrier to engaging with the intervention. In addition, the cognitive and emotional demands associated with intensive self-reflection were experienced as mentally exhausting by some participants. Working through the modules

could also bring personally distressing issues to the forefront, including challenges related to endometriosis and its consequences for participants' lives. Finally, participants described feelings of frustration, particularly when symptoms such as pain interfered with their ability to concentrate and engage with the intervention.

Table 3
Themes and subthemes identified and exemplary quotes

Theme	Subthemes	Exemplary quotes
Time-related barriers (38)	Lack of flexibility (6)	I also wanted to take my time when working through the lesson. As a result, I actually struggled to fit it into my daily routine. One week, it might have worked out to complete a lesson, but the following week, it wouldn't have fit in quite as well. A more flexible timeframe for completing the lesson would have been better for me, too. (P9)
	Private circumstances (7)	No, the [dropout] actually had nothing to do with the training itself; it was really because I had two deaths in the family. I didn't have the time—or rather, I had to focus on other things first. The requirement was that you had to reply within a week, and that just wasn't possible at the time. At that moment, the training didn't matter; I had to take care of other matters, like organizing the funeral, clearing out the apartment, and all the rest of it. (P6)
	Occupational circumstances (6)	It was actually purely for professional reasons. At a certain point, we were busy writing grant proposals and the like, and I simply wasn't in a position to do anything at all in my private life. I have to say, I was working around twelve hours a day back then. (P7)
	Lack of integration into daily life (12)	You know, you just get stuck in your patterns. Yeah, yeah. And I think it's incredibly difficult to change those patterns on your own. Yeah, and for me personally, it just wasn't enough to do this program for an hour once a week—so to speak—and get written feedback that I'd read once and then just put aside. (P3)
	Vacation (4)	For example, I was on vacation for two weeks and naturally didn't have a laptop with me, and—well, it actually just frustrated me because I couldn't work on my phone. (P3)
Technical and usability barriers (24)	Problems logging in (6)	However, whenever I clicked the link myself from my desktop—specifically the last place I accessed it—I kept getting a message saying the page couldn't be loaded, whether I was using a laptop, PC, or mobile phone. (P7)
	Poor mobile usability (5)	So, the editing on the mobile phone wasn't quite optimal either. (P5)
	Entries not saved (3)	I found it [the entries not being saved] somewhat frustrating, to be honest. It happened while I was writing quite a bit of content freely. I had started typing, then clicked on something, and when I tried to go back, all my progress was suddenly lost. (P1)

Note. Numbers in parentheses indicate the number of coded segments assigned to each theme and subtheme. As individual participants could contribute multiple statements to the same theme or subtheme, these numbers do not represent the number of participants.

Theme	Subthemes	Exemplary quotes
	Reminder e-mails in spam folder (4)	I never received the reminder e-mails because they consistently ended up in my spam folder, along with all other e-mails from the study. This made it difficult for me to stay on top of things, as it just wasn't so present. (P2)
Intervention design and implementation (54)	Intensity of contact with psychologist (12)	Well, that was my understanding beforehand. But the mistake might have been on my end—the idea being that you work even more closely with this primary therapist, so to speak, and that tasks are distributed differently within a district. In other words, more of a personal connection and different responsibilities. (P9)
	Unexpected high time investment (5)	To be honest, I hadn't imagined it would be quite this involved, I have to admit [...] I just thought I could fit it in on the side [...] but I think I kind of overlooked the fact that I'd actually have to seriously engage with myself in the process. (P1)
	Unexpected training design (9)	Um, I think at first I thought it was more of a questionnaire using rating scales, and then I had to get over the fact that there were so many open-ended fields and you had to write so much text. (P4)
	Criticism of intervention framework (28)	I would have said that you should have about three weeks to practise and then the next topic should come. I would have preferred that. (P6)
Perceived lack of relevance (31)	Topics no longer relevant (10)	Since I ended up in the waiting group, it completely slipped off my radar. I began the training with mixed feelings because I didn't feel it was the right fit for me at that moment. (P5)
	Missing contents (7)	I was a little disappointed that the training did not cover the topic of unfulfilled desire to have children. (P1)
	Lack of identification with intervention content (8)	Well, for one thing, the content focused heavily on the issue of pain. I don't experience pain to the extent that was consistently described there; it's not really a major issue for me in my daily life. Consequently, I sometimes found it very difficult to relate the tasks to myself personally, because they dealt with exceptional situations rather than everyday ones. That was essentially the main reason why my motivation waned as we went along—simply because I couldn't identify with the content of the exercises, or often couldn't even answer them at all, since I hadn't experienced severe pain—for instance—during the preceding seven days. (P9)
Emotional difficulties (24)	Physical Exhaustion (4)	Due to the symptoms of exhaustion related to endometriosis, I often found myself lacking motivation. (P9)
Note. Numbers in parentheses indicate the number of coded segments assigned to each theme and subtheme. As individual participants could contribute multiple statements to the same theme or subtheme, these numbers do not represent the number of participants.		

Theme	Subthemes	Exemplary quotes
	Mental Exhaustion (10)	Yes, engaging in that kind of self-reflection is always somewhat draining—both cognitively and emotionally—to keep going over it like that (P3)
	Personal problems stirred up (6)	The training stirred up a lot of emotions and there were always suggestions and techniques that should be tried out immediately. Of course, you wanted to give them a try, and afterwards, you felt quite overwhelmed. So, it was a very intense experience overall. (P6)
	Frustration (4)	I consistently felt frustrated whenever I experienced pain, which often affected my ability to work or maintain good concentration. (P7)
Note. Numbers in parentheses indicate the number of coded segments assigned to each theme and subtheme. As individual participants could contribute multiple statements to the same theme or subtheme, these numbers do not represent the number of participants.		

Discussion

The main goal of our mixed-methods study was to investigate the factors that contributed to dropout among participants in a guided iCBT intervention for endometriosis. To do so we used quantitative analyses to examine demographic, medical and psychological variables as potential predictors of dropout. In addition, we conducted semi-structured interviews with ten participants from the dropout group.

The dropout rate observed in our study (36.2%) falls within the range reported for previous online interventions. For example, Andersson et al. [30] and Hansen et al. [14] reported slightly lower dropout rates (34.5% and 28.6%), whereas Schmidt et al. [40] observed a higher rate of 45.3%. However, direct comparisons are limited by differing definitions of dropout. In the present study, dropout was defined as failure to complete all eight modules. By contrast, Schmidt et al. [40] used a less stringent definition, classifying participants as completers once 75% of the modules had been completed. Applying this criterion to our sample would have resulted in a substantially lower dropout rate of 22.8%. Beyond differences in the definition of dropout, variations in study design may also account for discrepancies in dropout rates (e.g., amount or intensity of therapeutic support, choice of control condition). While our findings show that the dropout rate lies within the range of comparable online interventions, identifying the underlying reasons is important in order to improve adherence in future iterations of the program.

Quantitative analyses

Quantitative analyses provided limited evidence for systematic baseline differences between participants who completed and those who discontinued the Ed.iTh intervention. With the exception of painkiller use, no significant differences were observed in the demographic, medical, or psychological characteristics examined. The overall lack of group differences may partly reflect the relative

homogeneity of the study sample. The strict eligibility criteria of the original Ed.iTh trial, including the exclusion of individuals with severe psychiatric conditions, regular benzodiazepine use, ongoing or planned fertility treatment, certain medical conditions, and recent CBT participation, may have reduced variability in characteristics potentially associated with treatment engagement. The lack of substantial baseline differences is also consistent with previous research showing mixed or weak evidence for demographic, medical, and psychological characteristics as predictors of dropout from internet-based interventions [46, 62–64]. Painkiller use was the only baseline characteristic that differed significantly between completers and dropouts, with a higher proportion of completers reporting painkiller use (62.1%) than dropouts (42.6%). This finding was supported by the exploratory logistic regression analysis. Following data-driven model selection, painkiller use and time since laparoscopy were retained in the final model; however, only painkiller use was significantly associated with dropout. Participants reporting painkiller use had approximately 59% lower odds of dropping out than those who did not report painkiller use (OR = 0.41, 95% CI [0.20, 0.81], $p = .012$). One possible explanation is that painkiller use may indicate greater symptom burden and, consequently, a greater perceived need for symptom management, which could increase motivation to engage with an intervention targeting endometriosis-related burden. However, this interpretation is not supported by corresponding differences in other indicators of disease burden: neither endometriosis-related quality of life nor menstrual pain intensity differed significantly between completers and dropouts. Painkiller use may therefore capture aspects of participants' symptom-management behavior rather than symptom severity itself. For example, individuals who actively use medication to manage their symptoms may also be more likely to engage consistently with other treatment approaches. Given the limited previous research on medication use as a correlate of dropout from iCBT and the exploratory, data-driven nature of the present analysis, this finding should be interpreted cautiously and requires replication.

Importantly, the final regression model explained only a small proportion of variance in dropout, suggesting that the baseline characteristics assessed in this study provide limited information about who is likely to discontinue the intervention. This is consistent with the absence of substantial differences across most demographic, medical, and psychological variables and suggests that treatment discontinuation may depend more strongly on factors arising during treatment or on participants' individual circumstances than on characteristics assessed before treatment. The limited explanatory value of baseline characteristics highlights the importance of complementing quantitative analyses with participants' subjective experiences. The qualitative interviews therefore provide an important additional perspective by identifying contextual and intervention-related barriers that cannot readily be captured by baseline measures, such as difficulties integrating the intervention into everyday life, technical and usability problems, mismatches between expectations and intervention design, perceived lack of relevance, and emotional demands.

Qualitative findings: Reasons for Dropout

Given the limited explanatory value of the quantitative baseline characteristics, the qualitative findings provide important additional insight into why participants discontinued the intervention. The analysis

identified five overarching themes reflecting barriers to continued participation: (1) time-related barriers, (2) technical and usability barriers, (3) intervention design and implementation, (4) perceived lack of relevance, and (5) emotional difficulties. These findings suggest that dropout was not attributable to a single factor but rather reflected an interplay between participants' everyday circumstances, their individual needs and expectations, and characteristics of the intervention itself.

Time-related barriers were among the most prominent reasons for dropout and were reported by all interviewed participants. This finding is consistent with previous research identifying time constraints as a major barrier to adherence to internet-based interventions [20, 65]. Participants described difficulties integrating the intervention into everyday life and indicated that more time between modules would have facilitated engagement, particularly because practicing and implementing therapeutic strategies requires sustained effort beyond merely completing the intervention content. Importantly, these findings suggest that dropout does not necessarily reflect a lack of motivation or perceived usefulness but may arise from difficulties reconciling intervention demands with work, family, or other everyday responsibilities. At the same time, simply extending the time available for each module may not necessarily improve adherence, as greater flexibility could also facilitate postponement. Future interventions may therefore benefit from combining flexible completion schedules with individualized planning and reminders.

Technical and usability barriers represented another important obstacle to continued participation. Participants described difficulties with platform access, login procedures, and the submission or saving of exercises, which sometimes resulted in frustration and disengagement. Similar technical barriers have been reported in previous iCBT research [40, 64, 66]. Unlike face-to-face psychotherapy, digital interventions require participants not only to engage with therapeutic content but also to successfully navigate the technological environment through which it is delivered. Technical difficulties may therefore create an additional and potentially preventable burden, particularly when they occur at critical points of engagement. Although providing extensive technical support requires additional resources, optimizing usability and conducting comprehensive user testing during intervention development may reduce avoidable barriers to adherence [67].

Intervention design and implementation emerged as a further source of barriers. Several participants reported a mismatch between their expectations and the actual structure or demands of the intervention, particularly regarding the required time commitment and the extent of therapeutic contact. This occurred despite participants having received information about the intervention by telephone and in writing before treatment. Providing information alone may therefore be insufficient to ensure that participants develop realistic expectations regarding the demands and format of an intervention [6]. More active onboarding procedures, such as demonstrating the platform, providing examples of typical exercises, or explicitly discussing anticipated weekly time requirements, may help participants make more informed decisions about participation and prepare for the demands of treatment. Expectations also concerned the level of therapeutic support. Several participants reported that they had expected more personal contact with the accompanying psychologist and experienced difficulties establishing a therapeutic relationship through written communication alone. Evidence regarding therapeutic alliance in

iCBT is mixed: while some studies indicate that a positive therapeutic relationship can develop in digital interventions [63, 68, 69], other research suggests that participants may miss direct human interaction [41]. This may be particularly relevant for individuals with endometriosis, who frequently report experiences of not feeling adequately understood or taken seriously within healthcare settings [70]. Supplementing written feedback with occasional telephone or video contact could therefore help strengthen the therapeutic relationship and maintain engagement. For example, the My-ENDO program evaluated by Hansen et al. [14] incorporated regular group sessions combining patient education with therapeutic support. Although the intervention format differs from Ed.iTh, this illustrates how more direct interpersonal contact can be integrated into digital or blended treatment approaches.

Perceived lack of relevance was particularly evident when intervention content did not correspond to participants' current symptoms, needs, or prior knowledge. Some participants reported relatively little pain, whereas others had already lived with endometriosis for several years and had independently developed strategies similar to those presented in the intervention. In addition, participants initially allocated to the waiting-list condition sometimes experienced a substantial delay before receiving access to Ed.iTh, potentially resulting in a mismatch between the intervention content and their needs at the time of treatment. Previous research similarly suggests that perceived relevance and appropriate timing are important for continued engagement with digital interventions [71, 72]. These findings highlight the potential value of greater personalization. Given the heterogeneity of endometriosis symptoms and associated life circumstances, a modular intervention structure that distinguishes between core and optional content may allow participants to focus more strongly on personally relevant topics [73, 74]. For example, optional modules could address issues such as fertility concerns or nutrition, while participants without these concerns could omit them. Greater personalization may thereby reduce the amount of content perceived as redundant or irrelevant and facilitate more efficient engagement with the intervention. The findings also point to the potential importance of intervention timing. Participants had, on average, been diagnosed with endometriosis several years before entering the study, and some reported that they had already acquired considerable knowledge and developed coping strategies independently. Offering psychological support earlier in the disease trajectory may therefore increase the perceived novelty and relevance of intervention content for some individuals. However, the optimal timing of iCBT in relation to diagnosis cannot be determined from the present data and should be investigated systematically in future research.

Finally, **emotional difficulties** constituted another barrier to continued participation. Participants described emotional exhaustion and, in some cases, difficulties engaging with intervention content that required them to confront distressing experiences or emotions. Emotional strain during psychological treatment is not specific to iCBT and may also occur in face-to-face psychotherapy [75]. However, the self-guided nature of much of the intervention may make it more difficult for participants to regulate the timing and intensity of emotionally demanding exercises without immediate therapeutic support. In the present study, emotional exhaustion was also linked to completing substantial portions of a module shortly before the deadline. More proactive guidance regarding pacing, combined with strategically

timed reminders and opportunities for additional therapist contact when exercises become emotionally demanding, may help participants engage with challenging content without becoming overwhelmed.

Taken together, the quantitative and qualitative findings provide complementary perspectives on treatment dropout. Baseline demographic, medical, and psychological characteristics showed little ability to distinguish participants who completed the intervention from those who discontinued it. In contrast, the qualitative interviews revealed a range of contextual and intervention-related barriers that emerged during treatment. Dropout may therefore be less strongly related to stable baseline characteristics than to the interaction between participants' current circumstances and needs and the way in which the intervention is designed and delivered. This highlights the importance of considering not only *who* drops out of digital interventions, but also *why* disengagement occurs.

Limitations

Several limitations should be considered when interpreting the present findings. First, the quantitative analyses were exploratory and based on a relatively small number of dropout events ($n = 54$), which limited the number of predictors that could be included in the multiple logistic regression. Moreover, predictors were selected using a data-driven approach, which may increase the risk of model instability and sample-specific findings. In particular, the observed association between painkiller use and lower odds of dropout should therefore be interpreted cautiously and requires replication in larger, independent samples. Second, the sample was relatively homogeneous due to the eligibility criteria of the original Ed.iTh trial. Participants were required to be between 18 and 45 years of age and to report substantial endometriosis-related impairment, while individuals meeting several medical or psychological exclusion criteria were not eligible to participate. This may have restricted variability in potential predictors of dropout and limits the generalizability of the quantitative findings to the broader population of individuals with endometriosis. Third, the qualitative findings are based on a small and self-selected sample of ten participants who agreed to be interviewed after discontinuing the intervention. Although exploratory comparisons indicated no significant baseline differences between interviewed and non-interviewed dropouts, the small interview sample limits the generalizability of the qualitative findings. Participants willing to take part in an additional interview may also differ from other dropouts in characteristics that were not assessed, such as motivation to provide feedback or willingness to reflect on their treatment experience. Fourth, although the interview data were coded by two coders, one of the coders also conducted the interviews and was involved as a psychologist in the intervention. This dual role may have influenced both the interview process and the interpretation of participants' responses. The involvement of a second coder and collaborative discussion of the category system may have reduced the risk of individual interpretative bias but cannot fully eliminate it. Fifth, the richness of the interview data varied considerably across participants, with some providing detailed accounts of their experiences and others offering only brief responses. Consequently, the qualitative analysis may primarily capture reasons for dropout that were particularly salient or consciously accessible to participants, whereas less explicit or difficult-to-articulate factors may have remained unidentified. Finally, interviews were not always conducted immediately after participants discontinued the intervention. The resulting time lag may have

increased the risk of recall bias and affected the accuracy with which participants remembered their experiences and reasons for discontinuation.

Despite these limitations, the mixed-methods design allowed quantitative patterns to be complemented by participants' subjective experiences, providing a more comprehensive understanding of factors associated with and reasons for dropout from guided iCBT for endometriosis.

Future implications

The present findings have several implications for both clinical practice and future research. From a practical perspective, guided iCBT interventions should prioritize platform usability by ensuring easy and intuitive access and minimizing technical barriers. Providing interventions that are compatible with mobile devices may further facilitate their integration into participants' daily routines. Clear and transparent communication regarding the intervention's scope, structure, and time requirements appears important for aligning participants' expectations with actual treatment demands. Greater flexibility in intervention delivery and sufficient time to practice and integrate therapeutic strategies between modules may further support sustained engagement. At the same time, flexibility could be combined with strategically timed reminders to help participants distribute intervention activities more evenly across the week. Given participants' desire for greater personal contact, additional opportunities for direct interaction with the accompanying psychologist, for example through occasional telephone or video calls, may also strengthen engagement.

Greater personalization of intervention content may represent another promising approach. Given the heterogeneity of endometriosis symptoms and associated challenges, modular intervention designs that combine core components with optional modules tailored to individual needs may reduce perceived irrelevance and unnecessary treatment burden.

From a research perspective, future studies should examine when dropout occurs over the course of an intervention (e.g., during early, middle, or later modules) and whether discontinuation is associated with specific intervention components. For example, emotionally demanding modules may represent critical phases during which participants could benefit from additional therapeutic or motivational support. Future studies with larger samples are also needed to systematically investigate baseline characteristics associated with dropout and to replicate the exploratory association between painkiller use and treatment completion observed in the present study. Such studies could additionally examine whether changes in participants' circumstances, perceived relevance, therapeutic alliance, or treatment burden during the intervention provide greater explanatory value for dropout than baseline characteristics alone.

Conclusion

To our knowledge, this is the first study to investigate factors associated with dropout from a guided iCBT intervention for individuals with endometriosis and to explore participants' subjective reasons for discontinuation. Quantitative baseline characteristics provided limited insight into dropout, with painkiller

use emerging as the only factor significantly associated with treatment completion. In contrast, the qualitative findings highlighted several contextual and intervention-related barriers, including time constraints, technical and usability difficulties, mismatches between participants' expectations and the intervention, perceived lack of relevance, and emotional difficulties. If replicated in future studies, these findings may inform strategies to improve treatment engagement and retention. Overall, the results highlight the importance of considering not only participant characteristics, but also individual circumstances and intervention-related factors when seeking to understand and reduce dropout from guided iCBT.

Declarations

Ethics approval and consent to participate: The study was conducted in accordance with the Declaration of Helsinki. The study was approved by the Ethics Committee of the Department of Psychology at Marburg University (Reference Number 2021-45v). All participants provided written informed consent to participate in the study. Participants taking part in the qualitative interviews additionally provided written informed consent for audio recording.

Consent for publication: Consent for publication was not applicable as no identifiable data are presented.

Availability of data and materials: The datasets generated and/or analyzed during the current study are not publicly available due to data protection regulations but are available from the corresponding author on reasonable request.

Competing interest: The authors declare that they have no competing interests.

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Authors' contributions: J.G. and C.W. conceptualized the study. J.G. collected the data. J.G. and C.H.G. conducted the quantitative analyses. J.G. conducted the qualitative interviews and analyzed the qualitative data with support from a trained research assistant. J.G. drafted the manuscript. C.H.G., E.S., and C.W. critically revised the manuscript. C.W. supervised the study and was responsible for project administration. All authors read and approved the final manuscript.

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Figures

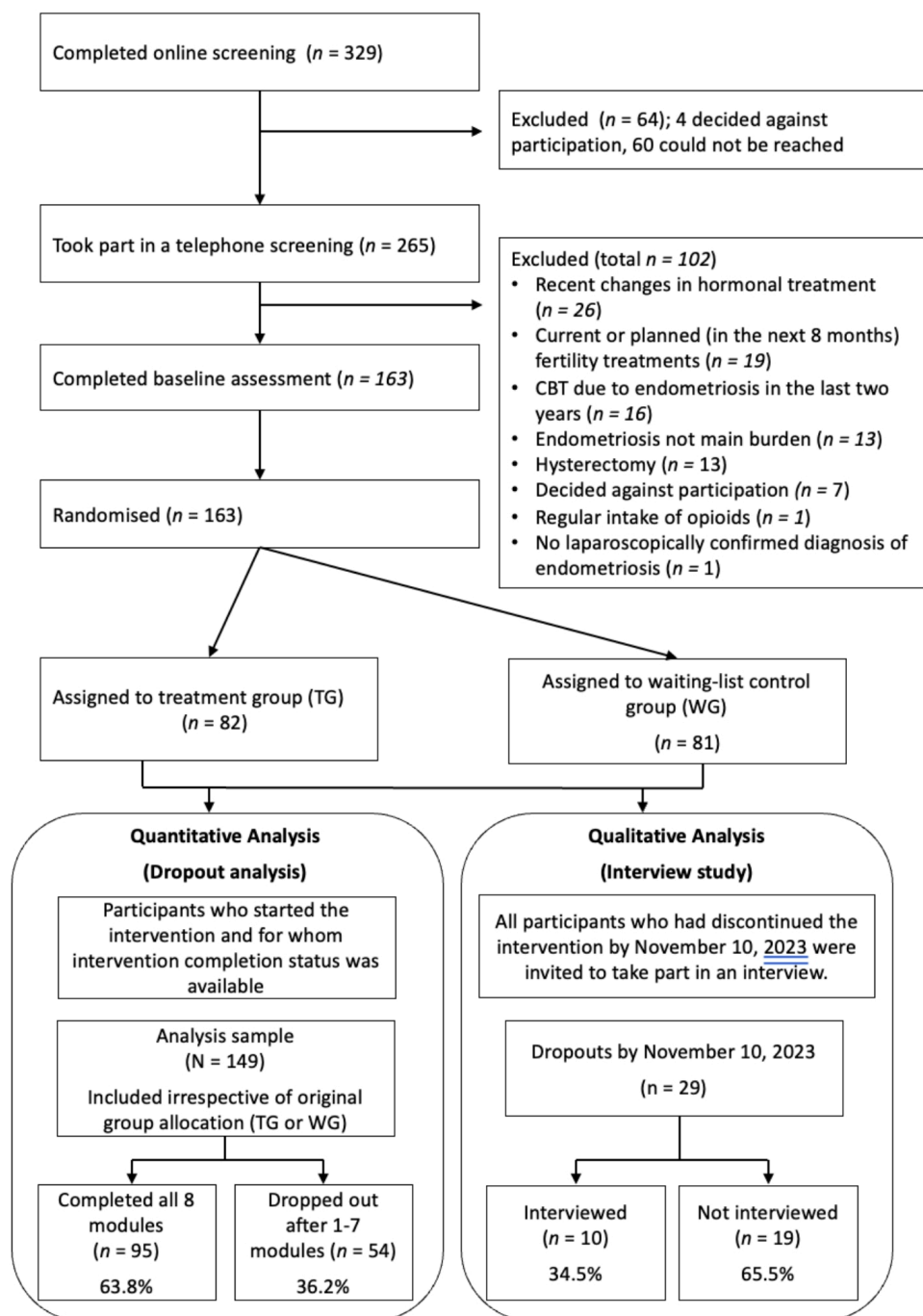


Figure 1

Flow diagram

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