Co-Design of a Single Session Intervention Chatbot for People on Waitlists for Eating Disorder Treatment: A Qualitative Interview and Workshop Study

Gemma Sharp, Bronwyn Dwyer, Jue Xie, Roisin McNaney, Pranita Shrestha, Christopher Prawira, Anne Nileshni Fernando, Kathleen de Boer, Hao Hu

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Abstract

Background: Eating disorders are a global concern and access to early treatment is critical to improve prognosis. Single session interventions have been proposed as an opportunity to provide short term support to people on waitlists for eating disorder treatment, however, there are not enough clinicians to provide this early intervention. Conversational artificial intelligence agents or “chatbots” reflect a unique opportunity to fill this gap in service provision.

Objective: To co-design a novel chatbot capable of delivering a single session intervention for people on the waitlist for eating disorder treatment across the eating disorder diagnostic spectrum and ascertain its preliminary acceptability and feasibility.

Methods: The study followed the design process of the Double Diamond model including four phases: discover, define, develop, and deliver. The study involved the co-design of a chatbot with 17 participants in total; 10 adults with a lived experience of eating disorders and 7 eating disorder clinicians, by conducting interviews and workshops with the participants. Feedback from the interviews and workshops of each phase informed the ideas and development of the next phase of the study. A final prototype of a single session intervention chatbot was presented to the participants in the deliver phase.

Results: Qualitative thematic analysis identified four main themes that were present across the four rounds of interviews/workshops: conversational tone, safety and risk management, user journey and session structure, and content.

Conclusions: Overall, the feedback on the single session intervention chatbot was positive throughout the Double Diamond process from both people with a lived experience of eating disorders and clinicians. Incorporating the feedback across the four themes and four phases allowed for refinement of the chatbot. Further research is required to evaluate the chatbot’s efficacy in early treatment settings. Clinical Trial: N/A

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Keywords: eating disorder; single session intervention; chatbot; conversational agent; artificial intelligence; mental health; digital health; double diamond approach

Introduction

Background

Eating disorders are a global issue defined by a disturbance in eating behaviour that impacts on an individual's physical and psychosocial functioning [1,2]. Due to the complexity of eating disorders, managing medical and psychiatric risk is an essential part of treatment. Anorexia nervosa has one of the highest mortality rates of all mental health conditions with death occurring either through physical complications of the disorder or suicide [3]. Eating disorders also place heavy economic pressure on medical systems due to increased service use [4]. Early intervention is considered best practice as it can substantially improve eating disorder prognosis [5,6]. Research has indicated that the more time that is spent on waitlists, the higher the chance of the patient discontinuing treatment when they do get the opportunity [7,8]. Thus, it is highly beneficial to offer people support while they wait to receive further treatment. Single session interventions (SSIs) have been proposed as a solution for this gap [9].

SSIs are conducted as once off sessions structured to encourage the person to make an intentional, positive change to their mental health [10]. SSIs have great flexibility. They can be designed for different therapy modalities, delivered by a range of means (trained professionals or self-help programs), and can cater to different audiences (individuals, groups, families, parents) [9]. As a result, SSIs have the potential to reach wider audiences and at a lower cost compared to multiple session treatments [9]. Schleider et al. [11] have proposed a framework for the development of mental health focused SSIs which is comprised of four elements. First, the inclusion of scientific evidence assists in normalising the person's experiences. Second, the incorporation of narratives from other people who have overcome similar challenges. Third, empowering participants to feel they are the expert in their experience. Fourth, designing "saying-is-believing" activities where the participant first identifies a challenge and then reflects on what advice they would give to a friend going through the same situation.

Prior Work

Preliminary research employing a psychologist-delivered SSI with adults on waitlists for eating disorder treatment has demonstrated promising results [12]. The SSI was based on elements from cognitive behavioural therapy-enhanced (CBT-E), which is considered to be the "gold standard" treatment for adults with eating disorders [13]. The SSI was designed to deliver CBT-E elements such as psychoeducation, including information on "starvation syndrome", which are the physiological and psychological effects of prolonged dietary restriction [14]. The SSI also included collaboratively designing a formulation which is a visual diagram that identifies the maintaining factors of the person's eating disorder [15]. The study (N = 448) found a significant reduction in eating disorder symptoms, psychosocial impairment, and depression symptoms from the time of completing the SSI to the first scheduled treatment session. However, as this study was quasi-experimental in nature, further rigorous research is required to demonstrate effectiveness. Nevertheless, to our knowledge, this is the only study that has specifically investigated the use of an SSI in an eating disorder clinical population.

SSIs have also been shown to be effective with non-clinical populations at reducing body image concerns and eating psychopathology [16-19]. SSIs use a variety of strategies including psychoeducation [16,18,19], imagery rescripting [17,18], and cognitive dissonance interventions [16,17]. In all studies involving a control group, participants who engaged with the SSIs showed a comparative improvement in eating pathology [16-18]. Thus, SSIs may be effective in a range of settings.

Recent Research

Research on digital mental health interventions has been increasing in recent years, including research on conversational artificial intelligence agents or "chatbots". Chatbots are digital technology that have the ability to engage in conversation with human users [20]. Chatbots have the potential to assist with diagnosis and triage, management and screening of symptoms, and deliver content such as psychotherapy interventions in the mental health sector [21]. Research has generally indicated that mental health chatbots are positively received by users [20,22]. To our knowledge, to date, four specific eating disorder and body image focused chatbots have been reported in the literature: *KIT* [23], *Alex* [24], *Tessa* [25], and *Topity* [26].

KIT, a rule-based chatbot (i.e., only generates responses based on predefined question-answering rules [27]), was designed to provide psychoeducational information and brief evidence-based coping strategies for individuals experiencing body image concerns and/or eating disorders as well as for people who were seeking support for someone else [23]. *Alex*, another rule-based chatbot [24], was created for when users complete an online eating disorder screener, and target the individual's motivation to engage with treatment. *Tessa* was designed to deliver StudentBodies©, an eight-session evidence-based eating disorder prevention program [28]. However, *Tessa* has undergone further development where the chatbot went from a traditional rule-based chatbot to having a generative artificial intelligence feature [29]. *Topity* [26], a rule-based chatbot which also used gamification, was created to deliver state-based micro-interventions to elicit in the moment and short-term improvements for body esteem, affect, and body image self-efficacy.

The above chatbots all offer a range of different supports for people who have body image concerns and eating disorder pathology. There are some similarities in the chatbot content, for example, *KIT* and *Alex* provide information on eating disorder psychopathology and the health impacts of eating disorders [23,24]. Media literacy was also identified as important content to include, and this was conducted through conversation in *Tessa* [25] and micro-interventions in *KIT* and *Topity* [23,26]. Across the four chatbots, a range of content is provided, however, information particularly focused on reducing specific eating disorder symptoms appears to be lacking.

Additionally, the chatbots have also been designed to be implemented at different points of the eating disorder treatment journey. *Tessa* [25] and *Topity* [26] have taken a preventative approach in targeting a risk factor of eating disorders: negative body image. *KIT* [23] and *Alex* [24] both aim to connect users with eating disorder services and to provide information on related topics to eating disorders. The current eating disorder and body image chatbots have all been designed to address

pre-help seeking or the very start of this process. However, there is a chance to incorporate chatbots at multiple points of the therapy process, such as the inclusion in therapy itself.

There is an opportunity to specifically bridge the gap between when a person is first referred for eating disorder treatment to when they see a mental health professional for the first time. With a considerable rise in people seeking treatment for eating disorders and subsequent increases in waitlist times [30], there is a critical need for a resource that is evidence-based to provide more timely support for those seeking treatment. Although, with technology rapidly developing, it is crucial that advances in the field maintain ethical and safe conduct [31]. For example, the aforementioned new generative artificial intelligence feature of *Tessa* chatbot led to the agent providing harmful dieting and weight loss advice [29]. Thus, careful consideration is required in the development of a digital resource as there is potential of significant harm if the technology malfunctions [32]. It is recommended that a multidisciplinary team approach is implemented into the design process as working with experts from different disciplines, such as mental health clinicians, researchers, developers, individuals with lived experience and ethicists ensures that appropriate safeguards are in place [31].

Our study

There is clearly an identified gap for people seeking eating disorder treatment and having access to early treatment. Therefore, we initiated the development of a chatbot to deliver an SSI to adults on the waitlist for eating disorder treatment across the eating disorder diagnostic spectrum. The SSI in the current study was based on the in-person psychologist-delivered SSI by Fursland et al. [12], where the core concepts were adapted to be delivered through chatbot technology. This study aimed to co-design this chatbot with people with a lived experience of an eating disorder as well as psychologists working in the field of eating disorders. The study assessed preliminary acceptability and feasibility of a prototype SSI chatbot through qualitative interviews and workshops.

Method

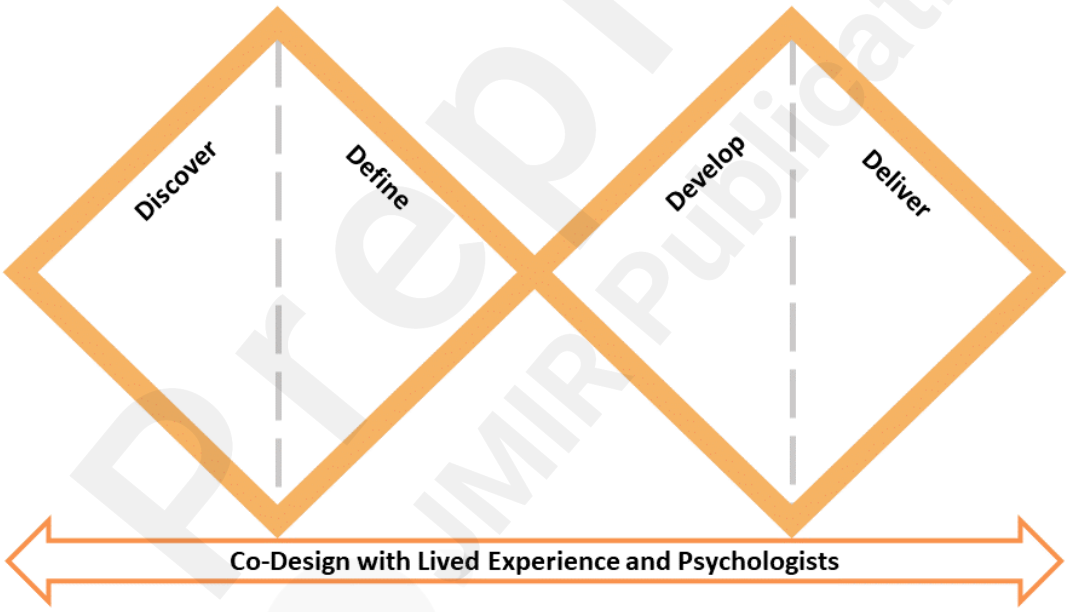
Participants

The study was open to participants who were aged 16 and over and living in Australia. People with a personal lived experience of an eating disorder, and in recovery for at least two years, were recruited by email newsletters from eating disorder support organisations. Online advertisements were placed on websites and social media accounts for professional bodies to recruit participants who were psychologists working in the eating disorder field. Potential participants completed an online expression of interest form linked to the email newsletters/advertisements and were then invited by author GS to participate in the online interviews/workshops based on availability. The study recruited a total of 17 participants. Ten individuals (8 women and 2 gender diverse people, aged 21 to 59 years) had a lived experience of an eating disorder and 7 psychologists (all women, aged 25 to 63 years) working in the eating disorder field. All participants were reimbursed with a $30 AUD online gift voucher for their interview/workshop participation.

Data Collection

The co-design data was collected in four phases according to the Double Diamond approach (see Figure 1). The initial phase (discover) of one-to-one interviews was conducted by authors GS and RM and in phases two (define), three (develop), and four (deliver), data was collected from co-design workshops led by author GS and supported by authors BD, JX, PS, ANF and KdB. For the workshops, lived experience participants and psychologists were grouped separately. A semi-structured question guide for each of the four rounds of co-design was developed by the authors which explored participants' perspectives, requested feedback and recommendations on ideas, and offered the opportunity for participants to share their expertise. This allowed for exploration in discussion and allowed for follow-up questions to be asked for more in-depth descriptive data. The initial interviews and subsequent workshops were conducted and audio recorded using the digital platform Zoom, whereby the discover phase interviews (April 2022) lasted from 35 to 50 mins (Mean = 45 mins), the define phase workshops (August 2022) from 45 to 66 mins (Mean = 53 mins), develop workshops (November 2022) from 63 to 77 mins (Mean = 68 mins) and the deliver phase workshops (May 2023) from 52 to 77 mins (Mean = 68 mins).

Figure 1. Double Diamond strategy utilised in the study adapted from [33].



Data Analysis

The qualitative data collected from the co-design interviews and workshops was analysed using a thematic analysis framework [34,35]. An automated transcription service was used to transcribe the audio recordings from all interviews/workshops. The transcriptions were read and checked for errors and initial ideas were noted. Next, researchers immersed themselves in the data and manually generated initial codes. Once the entire data set from each phase was coded, codes were grouped into overarching themes by GS, KdB, and BD. These themes were used to inform development of the chatbot for the next phase of the study. Upon the completion of all four phases, the codes and themes were reviewed by BD, who refined and named the themes. Author GS

oversaw all data analysis.

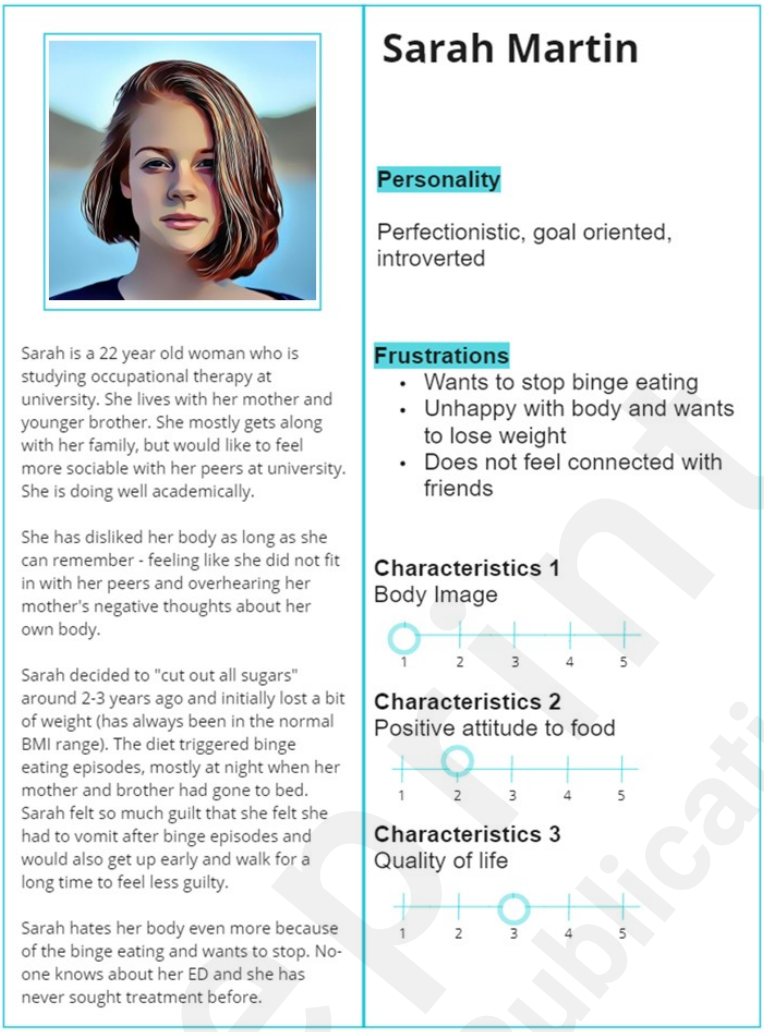
Ethics

This project was approved by the Monash University Human Research Ethics Committee (MUHREC ID 31812). All participants provided written and/or verbal consent to participate in the interview/workshop and the audio recording of the interview/workshop. People aged 16/17 were considered “mature minors” according to our institutional ethics approval and so could consent for themselves.

Design Process

For the co-design process for the study, the Double Diamond model was implemented [33], see Figure 1. The objective of the discover phase was to understand the level of acceptability by the different participant populations for the concept of a chatbot delivering an SSI to adult patients waiting for eating disorder treatment. Additionally, the perspectives of the participants were explored particularly focusing on the advantages and disadvantages of this proposed idea. In the define phase, key ideas and topics that emerged from the discover phase were refined. Topics explored in the workshops included proposed characteristics of a typical user of the chatbot (in order to generate personas, see Figure 2), the content of the chatbot, and gaining perspectives on preliminary examples of the chatbot dialogue.

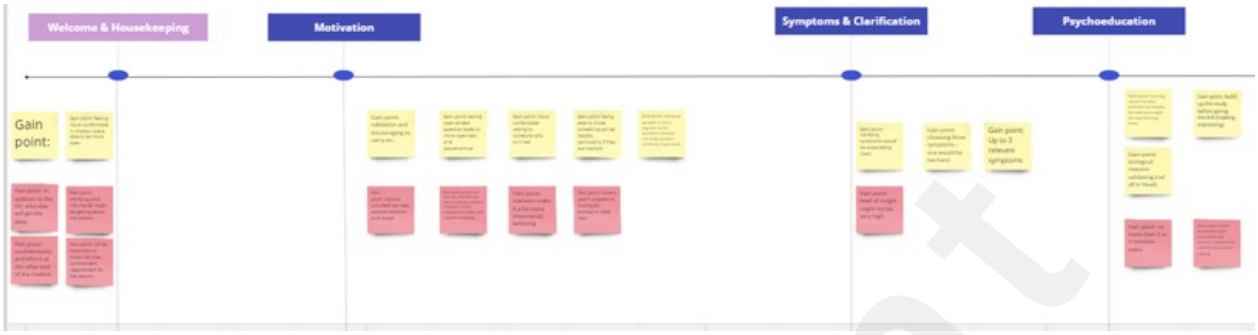
Figure 2. An example of a co-designed persona.



In the develop phase workshops, the co-designed personas were employed to guide participants through the proposed user SSI journey and seek feedback in the form of gain and pain points (Figure 3). Brief mock-ups of chatbot dialogue along the user journey were also presented for feedback.

Figure 3. A screenshot of a portion of the SSI user journey shown in the develop workshops with gain and pain points displayed in yellow and red post-its respectively. The linear, seven-section SSI

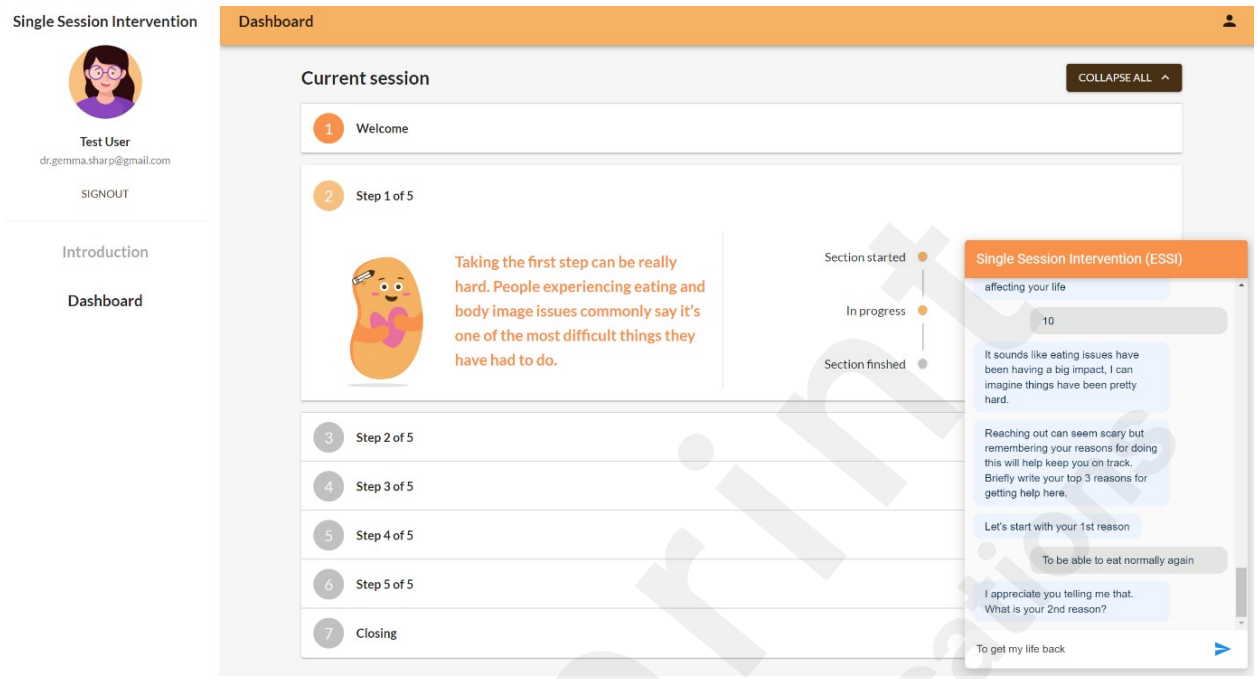
user journey, adapted from Fursland et al.'s in-person SSI [12], were: (1) Welcome and Housekeeping, (2) Building Motivation, (3) Symptom Clarification, (4) Psychoeducation, (5) Formulation, (6) Regular Eating, and (7) Closing.



The aim of the deliver phase was to implement the finalised chatbot design and preliminarily test the developed working prototype. Powered by the Google Dialogflow platform, this rule-based chatbot adhered to expert instructions to generate responses during a conversation. The chatbot captured user inputs and retained individual conversation history, accessible exclusively by the respective user. This was intentionally designed to prioritise safety and security. Subsequently, the chatbot was integrated into a specifically designed hosting web interface to enhance user interactions throughout the linear, seven-section user journey. Usability testing was conducted in the workshops and participants provided final feedback on the prototype (Figure 4).

Figure 4. Screenshot from the final prototype of the SSI chatbot web interface presented to the participants in the deliver phase. The specific chat interface is shown in the bottom right of the screen. The web-based user dashboard (displayed in the background) shows individual user progress through the seven SSI sections and displays short summaries of the chat for each section.

The co-designed SSI chatbot character is shown on the dashboard under “Step 1 of 5” and is also included in the chat interface.



Results

Seven one-to-one interviews were conducted for the discover phase, and four workshops were run for each of phase two (define), three (develop) and four (deliver) of the Double Diamond process. The sample for each phase was as follows: 7 participants for phase one (lived experienced = 4, psychologist = 3), 8 participants for round two (lived experienced = 4, psychologist = 4), 11 participants for phase three (lived experienced = 6, psychologist = 5) and 9 participants for phase four (lived experienced = 5, psychologist = 4). Please note that 10 of the 17 (58.8%) total lived experience/psychologist participants were involved in more than one phase of the research. Data analysis identified four prominent themes present through almost all phases of the development process: conversational tone, safety and risk management, user journey and session structure, and content. Next, themes are expanded on to provide a richer description. See Table 1 for accompanying quotes for the identified themes.

Table 1. Themes and quotes from the co-design process.

Phase	Participant Group	Quote Number	Quote
Theme: Conversational Tone			

Discover	Psychologist	1	“Is validation from a chatbot and hearing your experience the same as being in the company of another human being? Does it have empathy, and, I don't know the answer to this, but does it have empathy in the same way a human would?” [Participant 4, Woman, Aged 55]
	Psychologist	2	“I wonder what their level of engagement would be like, with a chatbot because they're not getting that human interaction. And I think that human interaction that provides all of that real validation and understanding, I think that might be the difference.” [Participant 3, Woman, Aged 34]
Define	Psychologist	3	”So, trying to validate them in terms of making them feel not alone. And I wonder if that’s one of the ways to go.” [Participant 5, Woman, Aged 25]
	Lived Experience	4	“Openness is really quite powerful, I think. And that leads into kind of motivating them more and wanting them to kind of seek more help. So, keeping their rhythm going for them.” [Participant 11, Woman, Aged 35]
Develop	Psychologist	5	“I wonder if we can say, ‘This might be really challenging, but the good news …’ you can sprinkle a bit of hope in there.” [Participant 5, Woman, Aged 25]
	Lived Experience	6	“I like how it makes him [persona] see the bigger picture of things. And once again, yeah, just that he's not alone.” [Participant 3, Gender Diverse Person, Aged 21]
Deliver	Psychologist	7	“I guess, like sort of real-time feedback from what the consumers have said, to sort of spit it back out, because I think that's important and it shows users that what they are saying is important, and sort of just validates what they're going through.” [Participant 5, Woman, Aged 25]
	Psychologist	8	“It's offering some validation, some empathy there straightaway without it feeling inauthentic.” [Participant 4, Woman, Aged 55]
	Lived Experience	9	“I like the goal part that it makes you… encourages a small change, or something

			that you can do. You don't need to worry." [Participant 11, Woman, Aged 35]
Theme: Safety and Risk Management			
Discover	Psychologist	10	"How does it cope with crises? So something like 'I really want to die', or 'I've got a medical emergency'. So, psychiatric or medical emergencies? I don't know how it would deal with that and where the risk would lie in that." [Participant 4, Woman, Aged 55]
	Lived Experience	11	"If you say to them, 'I'm struggling or this isn't right. What do I do?' the chatbot's not going be able to support you … Or, like wouldn't know the severity of what's happening or wouldn't be able to give you the right advice." [Participant 9, Woman, Aged 27]
Define	Psychologist	12	"I think a chatbot can assess risk, but what does the chatbot do if there is risk? What are the consequences of assessing risk?" [Participant 4, Woman, Aged 55]
	Lived Experience	13	"I was actually curious, say somebody starts to really explore the app and identifies certain symptoms that are occurring at the moment and we are looking at a quite serious situation. Is there the ability to give that person the choice to connect in with somebody, for example, that they've clicked into, or can it recommend going to emergency or contacting your GP [general practitioner]?" [Participant 12, Woman, Aged 46]
Develop	Psychologist	14	"Just making sure that the person using the services is aware that this isn't a crisis support, sort of service. And if they are feeling really distressed immediately that they should call triple zero [emergency phone number] or go to the local emergency department." [Participant 5, Woman, Aged 25]
Deliver	Psychologist	15	"I like that it's got the get urgent help all the way through." [Participant 2, Woman, Aged 58]
	Psychologist	16	"It terminates the session, if you're symptomatic…. that it seems appropriate. There's a sense of urgency around it, there's

			no point in being this chat if you are symptomatic. I like that it raises some sort of alert with the person in the session. You should seek medical advice if you experience these things." [Participant 4, Woman, Aged 55]
	Lived Experience	17	"Oh, that's awesome, it comes up with heaps of references." [Participant 9, Woman, Aged 27]
Theme: User Journey and Session Structure			
Define	Psychologist	18	"I think as long as you're clear about what's being sent to other people, the GP and the psychologist." [Participant 4, Woman, Aged 55]
	Lived Experience	19	"I think it's really important as well to state at the start that it's a robot." [Participant 9, Woman, Aged 27]
	Lived Experience	20	"You can always come back and check in. If you've had enough, you know, that sort of just coming back every now and then saying, you can come in and check in, do you need a break?" [Participant 12, Woman, Aged 46]
Develop	Psychologist	21	"Looks like the sort of flow you would have in an in-person session. So, it very much follows that." [Participant 4, Woman, Aged 55]
	Psychologist	22	"I think that first initial invitation is very important." [Participant 1, Woman, Aged 63]
	Lived Experience	23	"I think it flows really, really well." [Participant 11, Woman, Aged 35]
Deliver	Psychologist	24	"I didn't find it difficult at all. And I'm, I'm a moron when it comes to this sort of stuff." [Participant 2, Woman, Aged 58]
	Psychologist	25	"The more I'm going through this, I'm thinking it is nice to offer the opportunity to have a break rather than have people just disengage. I think that's quite nice to say, 'Have you had enough of this right now have a break and come back'". [Participant 4, Woman, Aged 55]
	Lived Experience	26	"I like it. I really like how it kind of checks in. So, I'm at the point where it's going 'Are you okay to continue?', which is really good." [Participant 11, Woman, Aged 35]

	Lived Experience	27	“If I was completing this as a client, I wouldn't feel like I was just talking to a literal chat, I would feel like, what I'm saying is going towards something purposeful and meaningful.” [Participant 9, Woman, Aged 27]
	Lived Experience	28	“The way that it ends, it feels unfinished.” [Participant 16, Woman, Aged 29]
	Lived Experience	29	“I think I'm at the end, I've got to the happy chatbot character….does that mean I have gone to the last section?” [Participant 11, Woman, Aged 35]
	Psychologist	30	“Just a bit of extra validation at the end, just to sort of tie everything up.” [Participant 5, Woman, Aged 25]
	Psychologist	31	“One thing I think would be nice at the end, too, is reminding the person of their reasons for recovery.” [Participant 4, Woman, Aged 55]
	Lived Experience	32	“I really like how, if you're feeling motivated giving people that option of further education.” [Participant 16, Woman, Aged 29]
Theme: Content			
Discover	Psychologist	33	“So, if there is a capacity, ultimately down the track for something that's a bit interactive would be helpful.” [Participant 4, Woman, Aged 55]
Define	Psychologist	34	“I think that you can’t be too rushed and I think it has to be in sort of bite-sized chunks. That’s easily understandable. I would imagine you would lose that sort of jargon.” [Participant 5, Woman, Aged 25]
	Psychologist	35	“I think having some sort of animation or video would really grab the attention of consumers.” [Participant 5, Woman, Aged 25]
	Psychologist	36	“I can appreciate the difficulty of creating a diagram like that, that's personalised and collaborative.” [Participant 4, Woman, Aged 55]
	Psychologist	37	“So, you don’t want the chatbot to suddenly come up with a diagram that it draws out and doesn’t wait for you to keep up or doesn’t offer you an opportunity for input. So, it’s very important it would be a

			collaborative part of the session." [Participant 4, Woman, Aged 55]
	Lived Experience	38	"I think it can be so overwhelming to get too much information at once. So, it's navigated at a time that suits them best. So, I think keeping it as simplified as possible." [Participant 12, Woman, Aged 46]
Develop	Psychologist	39	"You want to keep it fairly simple, I think. I'm trying to put myself in the position of a client seeing this for the first time, I'd be like, 'Whoa'". [Participant 4, Woman, Aged 55]
	Psychologist	40	"I did like the formulation section. So, I'm not saying delete it. I'm just saying if it's too hard, there is an alternative." [Participant 1, Woman, Aged 63]
	Psychologist	41	"The chatbot could have a template, for example, with the boxes already and then the chatbot kind of does a guide of like, 'how do you talk about your body image concerns?'" [Participant 6, Woman, Aged 52]
Deliver	Psychologist	42	"It's a really nice succinct little way of talking about it and the messages were really clear. You know, the key messages were highlighted but were also clear, which was great." [Participant 2, Woman, Aged 58]
	Lived Experience	43	"I love the content. I think it's fantastic. And it's very succinct and easy to read as well, it's relevant. If I was completing this as a client, I wouldn't feel like I was just talking to a literal chat, I would feel like what I'm saying is going towards something and purposeful, meaningful." [Participant 9, Woman, Aged 27]
	Lived Experience	44	"I liked it. It's interactive. And you have a record of what you said. The videos make a good break from answering questions, you just get a bit of information, but it's not like a lecture. And then the information is summarised, which again, is really helpful." [Participant 16, Woman, Aged 29]
	Lived Experience	45	"I think that could be actually very helpful. And I think the younger generation now that I'm teaching kind of young females as well, with my work, I find that this is kind of

			their preferred method to tell you the truth anyway, they're so tech savvy, and used to communicating kind of with computers before people." [Participant 8, Woman, Aged 42]

Theme: Conversational Tone

The tone of the chatbot was discussed extensively in all phases of the study across the lived experience and psychologist groups. Participants reported the importance for the chatbot to be able to provide therapeutic strategies, such as validation, promote a feeling of hopefulness, and normalisation (i.e., that emotional responses are a normal function) [36]. In the discover phase, the participants in both groups reported concerns that interactions with the chatbot would not provide the same experiences as interactions with a human clinician, and whether this would be a barrier to user engagement (Quotes 1 and 2). In the define and develop phases, the research team worked closely with the participants to develop the tone of the chatbot by working with mock-ups of the chatbot's dialogue. Participants discussed how therapeutic strategies could be adapted and delivered by a chatbot. Suggestions from the psychologist workshops reported normalising the feeling of isolation and revising the dialogue to include elements of hope (Quotes 5 and 6). In contrast, the lived experienced groups reported the significance of creating an environment where the user felt they could be open and honest with the chatbot (Quote 4). Participant feedback in the deliver phase stated that the prototype chatbot was able to provide therapeutic strategies throughout the session. Specifically, one psychologist participant reported that the chatbot was able to provide empathy and validation in an authentic way in response to the user reporting that their body image and eating behaviours were negatively impacting their life (Quote 8). This was further supported by two other participants who reported that the prototype chatbot was able to reflect back to users what they had said (Quote 7) and encourage positive change (Quote 9).

Theme: Safety and Risk Management

The psychologists and the lived experience participants identified in the discover phase that the chatbot would require the ability to manage medical and psychiatric risk. Participants from both groups reported uncertainty surrounding whether the chatbot would be able to manage crisis situations (Quote 10) and provide appropriate support (Quote 11) for medical and psychiatric risk. These concerns were stated again in the define phase, where psychologists reported that the chatbot may be able to assess risk, however, they were concerned about the implications of a chatbot assessing risk and the subsequent actions a chatbot could take (Quote 12). The lived experience participants reported the importance of being transparent with the user at the start of the session, where if risk was identified additional services (e.g., treating medical doctor) would be alerted due to safety concerns (Quote 13). This was also raised in the psychologist workshops in the develop phase, where the participants reported that it needed to be explicitly outlined to the user that the chatbot was not a crisis service from the start of the conversation (Quote 14). In the deliver phase, participants were shown a prototype of the chatbot's risk detection method. Both groups of participants reported their concerns were alleviated around risk as sufficient access to crisis resources were available throughout the session as well as the termination of the session when

medical or psychiatric risk was detected (Quotes 15, 16 and 17).

Theme: User Journey and Session Structure

In the define and develop phases, the proposed user journey of the SSI as delivered by the proposed chatbot was presented to both groups of participants. Both groups of participants reported approval of the seven-section session structure (Quotes 21 and 23). It was important to both groups of participants that the start of the session had an impact on the user. Participants reported that the start of the session had to be balanced between being friendly and inviting while also stating the parameters of the session, for example, a privacy agreement to communicate to the user who would have access to the session information, and stating to the user that the chatbot was not a real person (Quotes 18 and 19). Additionally, during the define and develop phases, the lived experience participants reported the importance for the chatbot to check in on the user's psychological well-being throughout the session and to offer a break to allow for the user to navigate the session at their own pace (Quotes 20). In the deliver phase, participants reported that the prototype chatbot session was easy to navigate and complete (Quote 24). Participants reported that they liked how the chatbot checked in with the user and offered breaks (Quotes 25 and 26). Specifically, a lived experienced participant reported that the design of the session felt relevant and purposeful (Quote 27). Some of the participants reported that the end of the session felt "unfinished" (Quote 28). Participants reported uncertainty about whether they had finished the session or not (Quote 29). Participants reported that the inclusion of additional validation statements (Quote 30), reminders of what was covered in the session (Quote 31), as well as providing opportunity for further education (Quote 32), would assist in providing a clearer ending to the session.

Theme: Content

The content of the chatbot SSI and how to present the information was discussed at length across all four phases. In the discover phase, participants reported that the chatbot SSI needed to have interactive elements to enhance engagement (Quote 33). In the define phase, the researchers explored how to present the content with the participants. Lived experience and psychologist groups reported that the information provided needed to be in lay-person language and small amounts of information presented at a time so that the user was not overwhelmed with information (Quotes 34 and 38). Additionally, both groups stated that including short videos in the session, including those featuring lived experience people, would help maintain the user's attention (Quote 35).

A typical component of eating disorder treatment, CBT-E in particular, is to introduce the patient to a formulation which is a diagram of how their eating disorder symptoms are connected and how this turns into a pattern of repetitive behaviour. This was identified as being the most difficult task for the chatbot to support and was discussed at length during the define, develop, and deliver phases. Participants reported that this task had to be collaborative with the user (Quote 39). The develop phase focused on how to simplify the formulation task (Quotes 39 and 40). Additionally, the psychologist participants stated that a template could be provided to the user to make the task

easier to complete (Quote 41). In the deliver phase, the participants were shown how the prototype chatbot conducted the formulation task using templates and both groups of participants approved of this strategy (Quote 42).

Overall, the prototype chatbot content was widely accepted in the deliver phase by both the psychologist and lived experience participants. Specifically, a participant reported that the messages of the intervention were clear and succinct (Quote 43). Participants stated that the interactive elements of the intervention provided a break from using the chat feature (Quote 44) and the user's contribution to the session felt purposeful (Quote 43). Participants reported that the chatbot would be very helpful, especially for young adult users who were more familiar with technology (Quote 45).

Discussion

Principle Findings

This study aimed to co-design, with people with a lived experience of an eating disorder and clinical experts in the field, a chatbot capable of delivering an SSI for adults on the waitlist for eating disorder treatment across the eating disorder diagnostic spectrum. Analysis of the qualitative data indicated four major themes across the four phases of the study; conversational tone, safety and risk management, user journey and session structure, and content. Across these themes, both groups of participants provided overall positive feedback, thus, the chatbot was deemed preliminarily acceptable and feasible.

The prototype chatbot was successful in being able to replicate some of the key elements of conversational tone to a clinician. This was deemed essential by lived experience and psychologists in the discover phase and throughout the entire co-design process. By being able to achieve this in the final prototype, this may assist the user in making positive changes discussed within the SSI. Discussion about management of safety and risk revolved around the limitations of the chatbot, for example, that the chatbot was not a real person, that the chatbot was not a crisis service, and that if risk was detected this goes beyond the chatbot's abilities and essential services will be alerted (e.g., the treating medical doctor). This influenced the final prototype where: disclosure statements about the above points were provided before the SSI began, appropriate crisis service contact details were provided when risk was detected, or the SSI terminated with the instruction to go to the nearest emergency department of a hospital. User safety was further enhanced through the development of a rule-based chatbot with predetermined responses which was strongly supported by both lived experience and psychologists. Some of the participants specifically mentioned concerns around potential harms of use of generative artificial intelligence in a mental health setting [29] and so were keen to make the SSI chatbot as safe as possible. Lived experience people and psychologists approved the user journey and session structure of the final prototype. The lived experience participants found the chatbot very easy to use and navigate, whereas some extra instruction was required for psychologists. Both groups readily accepted the content of the chatbot as it shared many similarities with the pre-established in-person evidence-based SSI [12]. Overall, both groups were highly accepting of the prototype chatbot.

Comparisons with Prior Work

Two other eating disorder focused chatbots (although not focused on early treatment/intervention) reported qualitative data in their development research and shared similar themes to those identified in the current study. The conversational tone in the current study was similar to the tone theme in the development of *Alex* [24] and the tone subtheme for *KIT* [23]. Across these themes, users reported that engagement in the chat increased the likelihood of making positive changes [24], and that it was important for the chatbot to use therapeutic strategies, such as normalisation [23]. Additionally, the user journey and session structure theme in the current study was reflected in the ease of use theme in *Alex* [24] and the flow theme in *KIT* [23], where ease of use and navigation of the chatbot's conversation were considered highly important. Interestingly, the safety and risk management theme identified in the current study was not reported in the development of *KIT* [23] or *Alex* [24], nor was it identified in a scoping review of user experiences of mental health chatbots [27]. Potentially, as the chatbot in the current study was designed to be integrated at the start of clinical treatment, safety and risk management was deemed even more critical for user safety.

The development of the chatbot SSI was based on Fursland et al.'s [12] in-person SSI which targeted assessment of eating disorder symptoms and provided educational information on eating disorders. For this in-person offering, 25% of the sample did not attend the SSI [12]. Thus, offering an SSI through a digital platform could potentially increase the percentage of people completing the SSI as well as providing more time to clinicians to attend to higher risk clinical matters. Attending in-person treatment for an eating disorder for the first time can be a daunting process and so a first session with a chatbot could help to ease some of the potential anxiety around attending further in-person treatment [23].

The design of the current study's chatbot SSI also aligned fairly closely with Schleider et al.'s [11] broader mental health SSI framework. Specifically, scientific evidence was included, such as information about the risks of eating disorders and on starvation syndrome [14]. Incorporation of people with lived experience through short video clips echoed the element of including a personal narrative. Additionally, the chatbot SSI was designed so that users took an active role in the session by bringing their personal experiences into the content of the session, particularly the formulation exercise.

Strengths and Limitations

The main strength of this study was the extensive co-design process with groups of people with lived experience and clinicians following the Double Diamond approach [33]. This human-centred design approach brought a broader range of expertise to the design team and allowed for the end user to be placed at the centre of the design process. Thus, the final product was more likely to meet the needs of the user. This can be seen by the high level of acceptability with the participants with the final prototype. Additionally, the content of the SSI was based on the gold standard of treatment for adult eating disorders, CBT-E, thus ensuring the chatbot is providing the highest level of evidence-based support.

There were, however, several limitations in the current study. First, there was little diversity in demographic characteristics within the sample from a lived experience perspective (e.g., mostly younger adult women). Therefore, it may be difficult to generalise the findings to the diversity of people impacted by eating disorders. Nevertheless, the personas developed to aid in the co-design were of multiple genders to attempt to reflect this diversity. Another limitation was that the co-design interviews/workshops were conducted with research team members and developers and so participants may have avoided providing very negative feedback knowing that the research/developer team were responsible for the chatbot design. Additionally, an inclusion criterion for the lived experience participants was that the participants had to be recovered from their eating disorder. Thus, there may be a bias as these participants have had a generally successful treatment experience. Future research is needed to investigate the effectiveness of the chatbot on user's eating disorder symptoms and motivation for treatment. Finally, we could have potentially involved other key stakeholders in the co-design process (e.g., other types of health professionals involved in eating disorder care such as dietitians as well as carers/supporters of people with an eating disorder). However, this SSI interaction is generally limited to a one-to-one interaction with psychologists and their adult patients.

Conclusions

The current study provides preliminary evidence for the acceptability and feasibility for a chatbot co-designed to deliver an SSI to people on the waitlist for eating disorder treatment. To the best of our knowledge, this is the world's first waitlist SSI chatbot for eating disorders. Overall, participants with lived experience and clinicians who work in the field of eating disorders provided positive feedback on the conversational tone, safety and risk management, user journey and session structure, and content of the chatbot. If proven effective, this chatbot has the potential to provide access to earlier treatment by filling crucial gaps in eating disorder care and to help people to recover more quickly from serious illness.

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Authors' Contributions

GS was involved in conceptualization, methodology, software, formal analysis, investigation, data curation, writing original draft, writing – review and editing, supervision, project administration and funding acquisition. BD was involved in methodology, software, formal analysis, data curation, writing original draft, writing – review and editing. JX was involved in conceptualization, methodology, software, writing – review and editing, supervision and funding acquisition. RM was involved in conceptualization, methodology, writing – review and editing, supervision and funding acquisition. PS was involved in methodology, software and writing – review and editing. CP was involved in software and writing – review and editing. ANF was involved in methodology, software,

writing – review and editing. KdB was involved in methodology, formal analysis, writing – review and editing. HH was involved in conceptualization, software, writing – review and editing.

Conflicts of Interest

GS is a Section Editor for JMIR Mental Health. All other authors have no conflicts of interest to declare.

Abbreviations

CBT-E: cognitive behavioural therapy-enhanced
SSI: single session intervention

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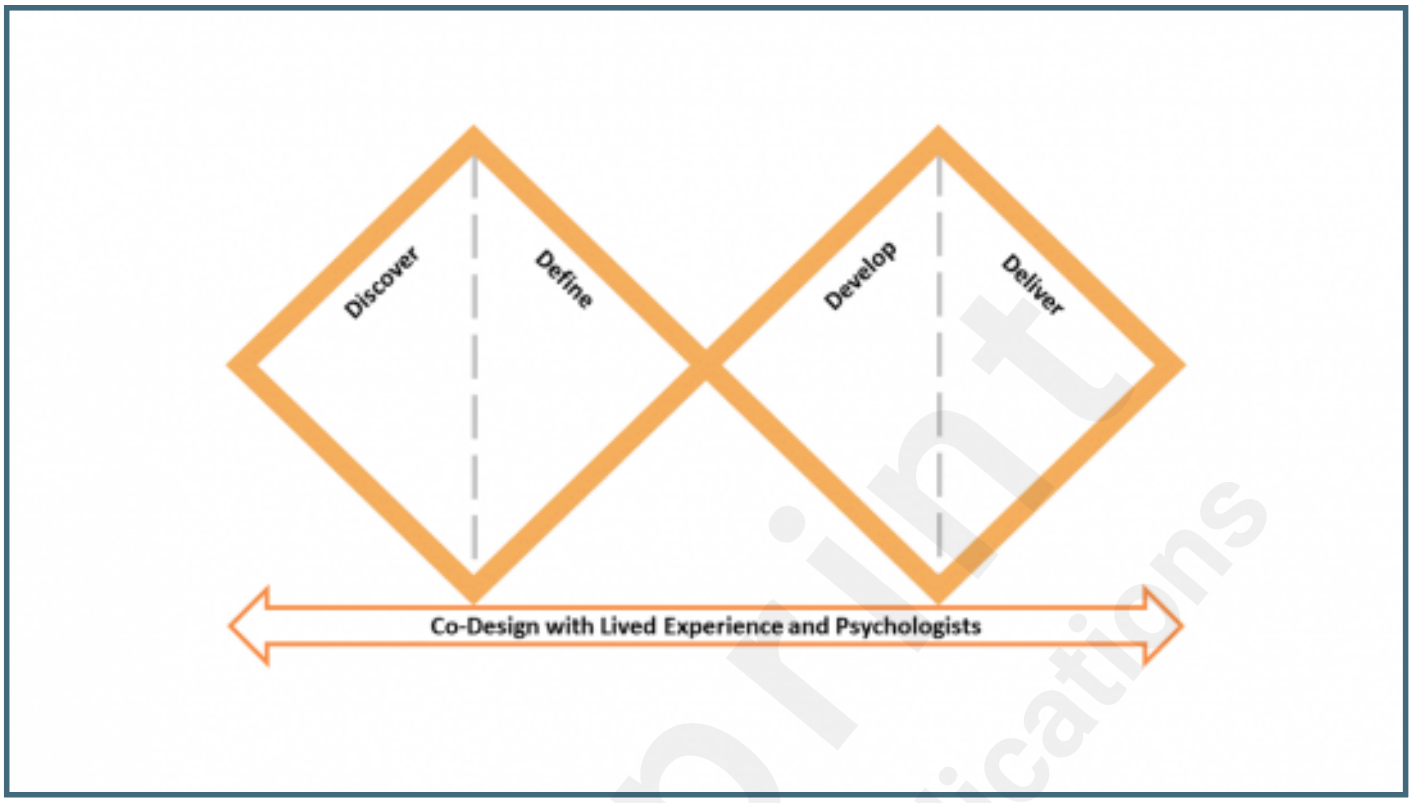
Supplementary Files

Figures

Double Diamond strategy utilised in the study adapted from [33].



An example of a co-designed persona.

A screenshot of a portion of the SSI user journey shown in the develop workshops with gain and pain points displayed in yellow and red post-its respectively. The linear, seven-section SSI user journey, adapted from Fursland et al.'s in-person SSI [12], were: (1) Welcome and Housekeeping, (2) Building Motivation, (3) Symptom Clarification, (4) Psychoeducation, (5) Formulation, (6) Regular Eating, and (7) Closing.

Screenshot from the final prototype of the SSI chatbot web interface presented to the participants in the deliver phase. The specific chat interface is shown in the bottom right of the screen. The web-based user dashboard (displayed in the background) shows individual user progress through the seven SSI sections and displays short summaries of the chat for each section. The co-designed SSI chatbot character is shown on the dashboard under “Step 1 of 5” and is also included in the chat interface.