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Designing a couples-based conversational agent to promote safe sex in new, young couples: A user-centred design approach

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ABSTRACT

The uptake of conversational agents (CAs) to deliver digital sexual health interventions is growing. While current CAs only address one user at a time, research suggests that couples-based interventions may be more effective at promoting safe sex in non-casual relationships by improving relationship functioning. In this paper, we describe user-centred design activities undertaken towards the design of a couples-based chatbot to address safe sex in new, young couples. A two-step approach was undertaken, in which young people were interviewed about their preferences and ideas, and sexual health professionals took part in a design thinking workshop. The design activities yielded a rich set of design guidelines from both groups, as well as a paper-and-pen prototype of the proposed CA from the workshop. As expected, trust was raised by both stakeholders as an important determinant of use and therefore heavily informs the design guidelines.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; **HCI design and evaluation methods**; *User studies*.

KEYWORDS

Conversational Agent, Chatbot, User-Centred Design, Design Thinking, Co-Creation, Sexual Health

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1 INTRODUCTION

According to the World Health Organization, more than 1 million sexually transmitted infections (STIs) are acquired every day worldwide, of which one-third are entirely curable [3]. Repetitive and untreated STIs increase the risk of long-term health issues such as infertility, cancer and increased susceptibility to human immunodeficiency virus (HIV) transmission, highlighting the urgent need for effective safe sex promotion efforts. Young people form one of the groups at high risk for acquiring STIs [55], characterized by their propensity for high-risk sexual behaviours paired with the reduced likelihood of them reaching out to professionals and health services [49]. Condom use remains one of the most effective methods to reduce the incidence of STIs. Contrary to popular belief, research suggests that young people tend to be more consistent with condom use during casual sexual encounters, and become less so in new monogamous relationships [43]. Even if a new relationship is perceived as monogamous, it remains important to engage in protected sex and conduct repeated STI testing during the initial stages to ensure the couple's safety as the individuals may still be susceptible to STIs from factors that preceded the current relationship [19, 35]. As the likelihood of an STI diagnosis only decreases about four to six months after the last sexual partner [35], young couples in the early stages of their relationship are an important target group for sexual health promotion efforts.

Digital health interventions (DHIs) have the potential to be an inexpensive, scalable public health solution that reaches at-risk groups, such as young people, while reducing the burden on health-care professionals. In recent years, DHIs for sexual health have begun to adopt conversational agents (CAs) as a delivery medium. It has been suggested that, compared to platforms such as websites and smartphone applications, CAs may be a more engaging, interactive and casual way to receive health information and interventions for young people [48]. The characteristic conversational style that mimics day-to-day instant messaging is not only second-nature to this group, CAs may also be able to address their desire to talk about sensitive topics with a caregiver without the presence of a real one [40]. CAs for sexual health are slowly but surely evolving in their capabilities, and there is preliminary support for their acceptability and effectiveness over a range of sexual health behaviours [8]. However, they currently only address one individual at a time. On the other hand, sexual behaviours tend to be a product of interpersonal processes occurring between two individuals in a relationship [38].



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Recent research indicates that safe sex interventions that target couples can be more effective than those that target individuals alone [20]. To our knowledge, there is a lack of CAs (or DHIs in general) for sexual health that address couples rather than individuals. CAs, however, may be particularly suited to deliver couples-based DHIs. Their unique conversational capacity may be able to initiate and promote open dialogue, and even mimic real-world couples' counselling, with the additional benefits of accessibility, anonymity and non-judgment. In this study, we therefore set out to develop a couples-based CA that promotes safe sex in new, young couples.

The sensitive nature of the proposed CA cannot be understated, and stems from three aspects: (1) sexual health domain, (2) adolescents and (3) couples. The CA we propose situates itself in a health domain that is often characterized by feelings of shame, embarrassment and awkwardness [10]. Users across all age groups tend to share skepticism in the competence and credibility of CAs, and their capacity to address the above-mentioned 'emotional' dimension of sexual health [40]. Adolescents appear to place equal if not more importance on the trustworthiness of digital interventions that target sensitive domains such as mental and sexual health, expecting respect, integrity and confidentiality on the part of DHIs [11, 12, 47, 57]. An additional layer of sensitivity may arise from adolescents being more likely to experience communication awkwardness, a lack of dating confidence, and heightened self-consciousness in new sexual relationships [22]; feelings that can worsen if not addressed appropriately. Furthermore, joint conversations with couples may lead to create tension between members of the couple [62]. In separate contexts, individuals may want to know what their partners said and can become suspicious if the person (or conversational agent) refuses to share this information to preserve confidentiality. In a joint context, one or both individuals can become wary of what they reveal during the interaction, and providing responses that they might not have separately to preserve the relationship. Couples can even become suspicious of motive, taking action to protect themselves and their relationship [15]. All of the above support the need to develop a conversational agent that is, among other things, trustworthy. Trust has been identified as an important determinant of user acceptance for health technologies [52], and for CAs targeting sexual health [8]. User acceptance is a pre-cursor to engagement and use; in a digital health context, this means that if users do not accept the technology, they also do not engage with the intervention itself, thereby rendering it ineffective [16]. This invites a careful and delicate approach to CA design that respects boundaries, behaves appropriately and forges trust with its users in order to facilitate use.

To that end, we describe a *user-centred design* approach that was undertaken alongside young people and health professionals to develop the above-mentioned couples-based CA. User-centred design prioritises the task of collecting information about and understanding user needs, or conducting *user research* [42], in order to produce designs that are more likely to be more successful. User research methods can provide insight into how users think and feel, and their needs, desires and preferences [23]. Going one step further is *co-creation*, which refers to "the collaborative generation of knowledge by academics working alongside stakeholders from other sectors" [30]. Stakeholders, including but not limited to the

user, actively participate in the creation of the design, and the generated solutions can often be of higher quality and more innovative than if the research team were to develop a design based solely on a set of user needs. Co-creation approaches have been used with success to design trustworthy technologies [33]. This study makes use of both user research and co-creation to work towards a design that is more likely to be appreciated, accepted and used by the target group.

Our contributions are three-fold. First, we pursue the design of a novel couples-based conversational agent for health promotion. The sensitive nature of the domain invites the additional need to address concerns regarding trust and privacy. Second, we do this by engaging both potential end-users and healthcare professionals in the design increase the likelihood that the design is both acceptable and effective for its intended users. This also empowers stakeholders to take on a larger role in public health initiatives and contribute to the generation of new knowledge. Third, given the promise of couples-based interventions for health [5] as well as health-related psycho-social functioning [6, 48], the formative research (encompassing insights from both stakeholders) can inform the design of similar conversational agents in the future. Through this paper, we are interested in answering the following research question:

RQ: What are the features and considerations of a couples-based CA to promote safe sex that (a) young people in new relationships may appreciate, and that (b) sexual health professionals recommend based on their expertise and experience?

2 BACKGROUND

2.1 Conversational Agents for Sexual Health

The uptake of conversational agents (CAs) for health promotion is increasing, particularly within sexual health. Out of 31 studies that were identified as investigating CAs for sexual health promotion in a recent review [8], close to 75% of the studies took place after 2017. Over the years, these CAs have evolved from using simple single-turn text-messaging to multi-turn embodied conversational interfaces, and possess functionalities ranging from questions-and-answers, goal-setting, reminders, educational content and enhancing motivation through rapport-building and dialogue, and have extended their focus to both safe sex as well as sex positivity. Several studies suggest that sexual health CAs can be an engaging, effective and accessible method of information provision and signposting in an anonymous and non-judgmental environment [8, 37, 40].

2.2 Safe Sex Interventions

2.2.1 Importance of dyadic context. It has long since been established that relationship context plays an important role in safe sex behaviours and the prevention of sexually-transmitted infections (STIs) [18, 25, 27]. On one hand, positive relationship functioning has been linked to protective factors, such as open communication and conflict resolution, which encourage the practice of safe sex [54, 58, 59]; in turn, poor relationship functioning has been linked to an increased likelihood of acquiring STIs by leading to concurrent relationships [4] and rapid serial monogamy after ending a relationship [44]. On the other hand, couples experiencing high levels of intimacy and closeness, or the desire thereof, may forgo

condoms with the belief that the act reflects love and trust for the partner [17, 51] and increases relational closeness [21, 43]. It becomes evident that while relationship context is a double-edged sword in its influence on sexual health outcomes, the consideration of the dyadic context is an important one. A couples-based CA may, for example, be able to facilitate protective relationship behaviours while addressing risk factors.

2.2.2 Couples-based interventions for safe sex. Several reviews [14, 20, 24] focus on couples interventions for human immunodeficiency virus (HIV) prevention that were delivered by trained human professionals. Across all three reviews, couples-focused programs outperformed individual-focused programs in increasing safe sex behaviours such as testing and condom use. The authors suggest that the positive impact of couples-based programs may stem from reduced discrepancy within the couple regarding perceptions, attitudes and knowledge surrounding sexual health, as well as enhanced communication skills that facilitate open discussions and joint decision-making.

However, human-delivered interventions are resource-intensive, rendering them less feasible, and potentially reducing their reach to at-risk groups; these concerns make digital alternatives an attractive solution. That said, digital couples-based interventions to promote sexual health are scarce. An eHealth toolkit was developed to aid Black, heterosexual couples in the prevention of STIs; it led couples through educational modules, value exploration exercises and the creation of tailored sexual agreements regarding topics such as condom use and monogamy [31]. A similar eHealth toolkit was evaluated with concordant HIV-negative same-sex male couples [39]. As eHealth interventions, they rely on the internet (e.g. websites or desktop applications) and therefore do not leverage the additional functionalities and increased engagement of newer technologies, such as smartphone applications and conversational agents. It is therefore unsurprising that there are no CAs that deliver couples-based interventions to promote one or more aspects of sexual health.

2.3 Dyadic Conversational Agents

Several couples-based CAs have been designed to support relationships both in and outside of therapeutic contexts. While these CAs were not designed for sexual health, they do overlap in their focus on promoting relationship health, which we have discussed is an important determinant of sexual health outcomes in couples. For example, a CA was developed to address episodes of relationship conflict through single user-initiated sessions based on cognitive behavioural couples therapy (CBCT) to both members of the couple individually [61]. Given the complex nature of conflict, users appreciated the CA as an accessible and non-judgmental alternative to a human therapist but found the CA's responses to be lacking the appropriate depth and empathy. The authors also note that the highly structured format of CBCT may interfere with creating a dynamic, engaging conversation. Lisa is another CA that delivers 10-minute sessions over two weeks in a pre-determined order based on a pre-existing intervention CBCT and emotion-focused therapy to improve and preserve relationship health [53]. Despite the structured format, the CA ensures interactivity by requiring users to perform an action (e.g. click a button or write a free-text response)

at least three to five times per minute. Lisa utilises additional strategies, such as addressing users by name and delivering praise after exercises, to boost engagement and create a positive atmosphere. While the CA can be used individually or by both members of the couple, it does not contain any functionality to integrate the two individuals' responses in any capacity. As a CA with an educational focus, users had a positive outlook towards Lisa, and appreciated the comfort and trustworthiness of the interaction.

It may be the case that a CA that presents itself as capable of performing complex tasks may be met with higher expectations and therefore lower satisfaction if the underlying technology is unable to support these tasks to the expected degree. In contrast, a CA that merely seeks to educate and inform could be perceived more favourably if it is able to perform in a way that is consistent with its proposed functionality.

Departing from the above-mentioned studies is a CA that was designed through co-creation to support long-distance relationships by including user-driven features such as 'deep talk', 'humour' and 'conflict resolution' [63]. A distinctive feature of this application is the capacity to support both synchronous group or triadic chat (CA and couple) and individual or dyadic chats (CA with each individual separately) in order to be able to effectively mediate communication for the couple. The CA also preserves privacy by requiring CA-directed responses to start with the symbol '/' without which the CA does not "read" the couple's messages to each other. After one week, based on users' qualitative feedback, users evaluated the CA to be helpful at mediating conflict and emotions, promoting deeper conversations and increasing closeness between couples. Users also appreciated the option of dyadic chats for topics they did not want to discuss in the group chat; interestingly, the role of the CA was perceived as either a mediator (in dyadic chats) or a bystander (in group chats) depending on the context. While the CA was designed in a bottom-up manner, the researchers also acknowledge the potential role of theoretical frameworks, such as social penetration theory, in enhancing the CA's capacity to appropriately support relationships across their whole lifespan. This study illustrates the value of co-design in pushing the boundaries of couples-based CAs and arriving at features that users appreciate and are more likely to engage with.

Couples-based CAs have not yet been explored for purposes other than supporting relationships. Similar to [63], we adopted co-creation to design the CA with the goal of obtaining a deep understanding of users' needs, and generating innovative and appropriate solutions. However, in addition to potential end-users, we also include service providers i.e. healthcare professionals [30] to leverage differing perspectives towards an intervention that is acceptable as well as effective [26]. Furthermore, in contrast to previous CAs [53, 61], we also strove to design a true couples-based interaction, in which the responses of both individuals can actually be integrated. This decision was motivated by the support for couples-based interventions for sexual health, which allow and often require couples to participate together. However, as it was unknown whether the triadic chat feature from [63] would be acceptable in this context, no further assumptions were made about the CA design.

2.4 Study Overview

The design process of the conversational agent, or chatbot, took place in two phases: (1) user interviews, and (2) co-creation via design thinking workshop. During the first phase, a sample of young people were interviewed about their preferences and needs for a couples-based chatbot to promote sexual health. From these interviews emerged an archetype for this user group as well as a set of design guidelines. In the second phase, a group of sexual health professionals were recruited for an intensive on-site one-day design thinking workshop. The outcomes from the user interviews were provided to participants to increase empathy for the user group. The professionals then produced, in addition to a set of design guidelines, a paper-and-pen prototype of their proposed chatbot interaction. The materials used in this study can be found at <https://osf.io/c2zdy/>.

3 PHASE I: USER INTERVIEWS

3.1 Method

In a separate study, the research team developed a chatbot that talks to young people about condom use in new relationships, and conducted a qualitative evaluation of user acceptability through individual interviews. This evaluation is outside the scope of the current paper, and therefore will not be discussed much further in detail. The same interviews included additional questions that were also used to conduct user research i.e. understand users' needs, preferences and suggestions for the design of the subsequently-planned novel couples-based chatbot interaction. The primary goal of the user interviews was therefore to arrive at a set of design guidelines from the perspective of potential end-users i.e. young people in new relationships. Attaching the user research component to the evaluation study served two purposes: in addition to eliminating the need for a separate resource-intensive study, it was also expected to increase the quality of responses obtained from participants. As it stands, sexual health chatbots are relatively new and not commonly encountered; interacting with a working prototype provided the participants with a frame of reference which helped them articulate their responses better with regards to a couples-based sexual health chatbot.

3.1.1 Participants. Individuals could take part if they were between the ages of 18 and 25, currently in a sexually-active relationship, and either identified as male or had a partner that identified as male. Participation was on a voluntary basis, and participants were reimbursed appropriately for their time. A total of 23 participants were included in the final study from the University of Amsterdam of which one identified as non-binary, six identified as male and the rest as female. 14 participants (60%) self-reported that they were in a relationship with their significant other, five participants said they were currently single, three participants said they were casually dating and one participant declined to report.

3.1.2 Materials.

(1) *The Chatbot*

Participants interacted with a chatbot designed to discuss condom use in new relationships. To encourage the user to think about and improve behaviour regarding their own (non)condom use, motivational interviewing (MI) [36] was

used as the guiding theoretical model for the interaction content. The chatbot led users through four segments, each of which corresponded to one of the four phases of MI. The chatbot also made use of basic MI techniques such as open questions, reflections, summaries and affirmations. It was fully-automated and was deployed through `rocket.chat` [1] on a local server. Pre-written conversation trees were used to structure the interaction, and user responses were processed through trained classifiers. The entire interaction lasts around 20 minutes.

(2) *The Interview Guide*

The interviews were aided by an interview guide, which consisted of seven topics: user engagement, information quality, self-disclosure & comfort, therapeutic alliance, motivational interviewing, usage intentions and couple-use. The first six topics were relevant for evaluating the user acceptability of the chatbot the participants had interacted with, and therefore will not be addressed in the remainder of this paper. The final topic i.e. couple-use tapped into the possibility of extending or modifying the chatbot for couple use using the prompt below. Participants were asked to elaborate on their answers where appropriate, including how they envisioned this interaction, what kind of features it should have, and the facilitators and barriers of such an interaction. Follow-up prompts such as "what made you feel that way?" or "why do you think so?" were used to encourage more in-depth responses.

3.1.3 Procedure. The entire study took place online. Each participant was invited to a Zoom meeting, where they were introduced to the study and then instructed to access and interact with the CA. After the interaction, they took part in individual, semi-structured interviews about their experience, which lasted anywhere between 30 minutes and 1 hour.

3.1.4 Data Analysis. All interviews were transcribed and coded using thematic analysis [13] through `atlas.ti`. Line-by-line coding was done to capture as much detail as possible from the responses. As the next step, focused coding was conducted to organize the codes in a meaningful manner. Seven main focused codes were applied to all codes in line with the topics listed in the interview guide, and additional focused codes were developed to capture relevant sub-topics under each topic. The resulting structure was discussed with the second author, and then the research team, in order to make sense of the data and ensure the validity of the categorizations. The resulting codes were then consolidated into coherent themes that captured the participants' thoughts, feelings and suggestions for each topic present in the interview guide. For the present design process, only the themes that emerged surrounding the topic of couple use were used. Each theme captured a specific user need, preference or concern that participants expressed, and is therefore presented as a design guideline that addresses these.

3.2 Results

3.2.1 Design Guidelines. This section describes the findings from the user interviews pertaining to the topic of a couples-based chatbot interaction to promote sexual health in new, young couples.

Four themes emerged from the user interviews, each of which corresponds to, and is therefore discussed as a design guideline that addresses, a specific user need, preference or concern that participants expressed.

1. Encourage Communication and not Condom Use

All users agreed that the chatbot should focus on improving communication within the couple, as this was seen as the primary determinant of safe sex practices in new relationships. Additionally, it was considered strange and intrusive for a chatbot to interfere with one's sex life in a direct manner, and it was discouraged for the chatbot to engage in explicit behaviour change processes, especially at the start of the intervention. As a sidenote, assuming a potential longitudinal interaction, attempting to engage in behaviour change too early was expected to increase resistance.

Importantly, the chatbot should facilitate and encourage communication, but should not speak for, or try to mediate for, either party. Users were of the view that couples should directly be talking to each other about sex. They felt that it would be strange and even insulting that their partner would speak to a chatbot but not them, and were concerned that a mediating chatbot may encourage maladaptive behaviours such as only being able to talk through the chatbot.

2. Holistic Focus on Sexual Health

It was essential that the chatbot did not solely focus on safe sex, as this would come across as awkward, boring and not useful. Instead, users wanted the chatbot to take a more holistic approach to sexual health, addressing topics such as relationship dynamics, sexual identity and pleasure.

3. Triadic, Not Dyadic Chat

Almost all users were uncomfortable with separate, dyadic chats. There were concerns about what each individual would reveal about the partner and relationship behind the other's back, and subsequently, whether this information would be used by the chatbot "against the partner" without their permission.

In response to the initially-proposed dyadic focus, the first user proposed an alternative: triadic group chats, in which the chatbot addresses both individuals of the couple in the same conversation. The researcher updated the interview guide to include this alternative, and pitched it to subsequent users. Several advantages emerged upon further discussion. First, the interaction would be "out in the open" – both individuals will be aware that the conversation is happening, what is being said and who has access to what is being said. Second, users envisioned this interaction as a potential ice-breaker in a new relationship, and with the incorporation of game elements and humor to decrease awkwardness. Third, users anticipated that the chatbot could "profile couples" and "highlight relationship nuances" in this setup, which would provide valuable feedback to the couple and allow the chatbot to personalize the interaction further.

4. Concerns about pitching to partner

Users expressed the potential difficulty of bringing up the chatbot with a new sexual partner. It was mentioned that a new relationship is a delicate and somewhat awkward period for couples as they get to know each other. Unsure of what their partner thinks and how they might react to certain situations, participants agreed that

discussing safe sex is already a potentially uncomfortable topic. In this context, the chatbot may potentially be "adding fuel to the fire" as the partner may view this as strange, negatively impacting the relationship in its early stages.

It was often the case that the user themselves, mostly females, would be open to using such a chatbot with their partner, but that their (male) partner would not. Conversely, male users were largely neutral and were open to using the CA as long as their (female) partner found it acceptable, and even suggested that the target group (new couples which need to engage in consistent condom use) might not want to use such a chatbot as they do not believe they require information, help or reminders.

The chatbot should instead present itself in a more holistic manner, as attempting to support couples towards a healthy relationship and sex life. While the barrier may still be present, it may now be lower as individuals can pitch the chatbot as something that 'fosters relationships' and brings couples closer.

4 PHASE II: DESIGN THINKING WORKSHOP

4.1 Method

To engage in co-creation with healthcare professionals, a design thinking workshop in the form of a design sprint [2] was conducted. Design sprints are an agile methodology that leverages design thinking principles and culminates in a minimum viable product in a shorter period of time. First introduced by Google in the form of a 5-day workshop, each day is devoted to a design phase: empathize, ideate, select, prototype and test. While it is recommended to conduct all design phases in full, there are instances in which this may not be practical nor necessary. In our case, there were challenges associated with encouraging participants to commit even to a one-day workshop, let alone five. We therefore adopted a 'one-day sprint', in which the activities are condensed into one day rather than five. Additionally, as we intended on evaluating the chatbot at a later time, the test phase was not included in the sprint. The goal of the workshop was two-fold: (1) to arrive at a prototype, or an interaction outline, of a couples-based chatbot interaction to promote sexual health in new, young couples, and (2) to arrive at a set of design guidelines that captures the factors that may be important for this design from the perspective of sexual health professionals.

4.1.1 Participants. Through convenience and snowball sampling, we recruited four sexual health professionals that work in different branches of the municipal health service (Dutch: Gemeentelijke Gezondheidsdienst, GGD). While their specific backgrounds varied, they all work, or have worked, personally with young people and have actively contributed to successful national public health campaigns. Three participants were female, and active social nurses for sexual health working across the Netherlands, and the fourth participant was male, and an accessibility project officer trainee for GGD Amsterdam. Their years of experience ranged from 2 years to 10 years in the field.

4.1.2 Materials. The moderator devised a schedule and script, and used this to structure the workshop; this outlined specific instructions for the moderator to follow, as well as for the moderator to disseminate to the participants. Participants were provided with an

endless supply of blank paper and markers, as well as handouts to guide their thought process.

4.1.3 Procedure. Participants were led by the moderator through the different design thinking steps, while the moderator conducted the workshop, another member of the research team took notes to capture the unfolding discussion. The artefacts, or the materials generated during the workshop, were preserved and analyzed alongside the paper prototype of the interaction and notes written by the observer to trace the design process, organize the findings and extract design guidelines. The procedure for each design thinking step is described below.

- (1) *Introduction.* The moderator conducted a round of introductions, and asked participants to describe ‘a day in the life’ as well as recent projects they had been involved in, which sparked curiosity, conversation and follow-up questions in the group.
- (2) *Empathize and Define.* The moderator began by presenting the overall goal of the design thinking workshop, which was to design a couples-based chatbot to promote sexual health in new, young couples – this was informed by the research team’s goals. Then, participants were also provided with handouts that presented the archetype conveying young people’s needs, preferences and concerns and the design guidelines obtained from the user interviews from Phase 1. The moderator took extra time to walk through the findings from the user interviews to enrich the professionals’ perspective and increase their empathy for the user group. As they were being presented with new information about the design scope and the user group, participants asked questions, offered opinions, and engaged in discussions, which laid a solid foundation for the next step. The moderator finally posed the following guiding prompt for the rest of the workshop, which was kept as broad as possible to encourage creativity and discussion: “How might a chatbot help a new, young couple practice safe sex?”
- (3) *Ideate.* Participants were enthusiastic, and engaged in an unconstrained and brief brainstorming session. After this, they took part in a brainwriting exercise [56]. For this, each participant was provided with a stack of sticky notes belonging to one color, and had six minutes to write down all their ideas on the sticky notes and arrange them on their paper. After six minutes, they moved onto the next participant’s paper and continued using their own sticky notes to either build on the ideas in front of them or add new ones. This continued until every participant had contributed to every other participants’ ideas, or when one full round was complete.
- (4) *Select.* As expected, a large number of ideas were generated during brainwriting, and referred to things a chatbot can say, do, use, or refer to during the interaction. These were trimmed down using the categories method [50]: all papers containing the ideas were gathered on a central table, and participants were instructed to categorize each idea using stickers of three colors, representing most feasible, most liked, and long shot. It was explained that the ideas that were both feasible and liked were good candidates to proceed with. Participants engaged in discussion, weighing the pros and

cons of each idea and mutually decided which ideas were carried over to the next step.

- (5) *Prototype.* The group gathered around a central table and were provided with a single roll of paper which contained an empty interaction timeline i.e. a long strip of double-sided tape. Through discussion, participants organized the selected ideas on the timeline to show how the chatbot can approach the couple during the session. The moderator only served to intermittently pose questions and ask for clarifications on the proposed design to encourage participants to flesh out the design in more detail. This included the specific type of questions the chatbot should ask, the topics the chatbot should address, the order in which the ideas are most relevant and therefore best placed, and other relevant input.

4.2 Results

This section describes the findings from the design thinking workshop. First, we provide an overview of the design artefacts produced during the different steps of the workshop. Then, based on the design artefacts, observer notes and paper-and-pen prototype, we present a set of design guidelines proposed by the sexual health professionals.

4.2.1 Design Artefacts. This section describes the flow between the ideas produced in *Ideate*, which were then trimmed down in *Select* and how the ideas were fleshed out and structured in *Prototype*

- (1) *Ideate*
The ideation step resulted in a myriad of ideas which were sorted into different categories [Table 1](#).
- (2) *Select*
Most of the ideas generated during the ideation step were well-liked and feasible, and were therefore selected as good candidates to include in the chatbot prototype. However, several well-liked ideas were generated during this step that did not make it further given either the project scope or feasibility concerns. Examples of these included switching the focus of the chatbot from couple dyads to parent-child dyads, utilising rich media content such as dedicated TikTok channel, visualisations and animations, and interactive games, functional integrations with the existing national healthcare system, ways to increase the reach of this application, and ensuring that this chatbot was immediately accessible to the whole young population. The chosen ideas therefore largely pertained to increasing attractiveness, incorporating fun, and integration with the existing healthcare system to the degree that this was possible.
- (3) *Prototype*
The prototype of the chatbot interaction was created collaboratively by the workshop participants using paper-and-pen. To improve readability, a clean version of the prototype is provided below in [Figure 1](#). The prototype includes ideas that are to be implemented throughout the entirety of the chatbot interaction (in grey boxes), and ideas that are activities that the chatbot is suggested to carry out in sequence (in bold, above timepoints on the timeline).

Topic	Ideas
Accessibility	<ul style="list-style-type: none"> • The concept of accessibility applies to all aspects of the interaction, including content, animations and language annotated • For all demographics, including sexual orientation, gender and culture • Concise, clear and consumable language • Offering the chatbot in locally-relevant languages
Integration with existing health-care system	<ul style="list-style-type: none"> • Highlighting opportunities to get more support • Linking to existing healthcare organisations, websites, resources and tools • Examples include finding a local healthcare provider and booking appointments • Utilising existing visual templates affiliated to existing healthcare organisations to increase recognizability and to present a unified front
Increase attractiveness	<ul style="list-style-type: none"> • The main topic should be on positive sexual experiences, while condom use and sexually-transmitted infections should be a secondary focus • Addressing topics that interest young people e.g. how to have good and satisfying sexual experiences • Addressing topics that are more relevant to young people e.g. pressure to succeed sexually, and how to be a good partner • Being able to ask your own questions, or follow-up questions, or other ways to learn more about desired topics • Explaining concepts using visualisations and animations
Incorporate fun	<ul style="list-style-type: none"> • Usually refers to games or other interactive elements that encourage participation and capture attention • Games are seen as an effective way to raise awareness while still being fun, low-threshold and accessible to the larger population • Examples include: (a) demystifying sexual health by addressing common myths (b) using stories that young people can relate to (c) using quizzes to learn more about each other • It could be interesting in a three-way interaction to pose the same questions to both individuals at the same time and compare them, which can provide openings for insightful conversations
Increasing reach	<ul style="list-style-type: none"> • Leveraging social media platforms popular with young people i.e. Instagram and TikTok • Using viral challenges and dedicated channels to increase engagement, and provide consumable content • Using commercials • Promotion during health consultations and with school administrations
Targeting other influences	<ul style="list-style-type: none"> • Upbringing plays an important role in young people’s sexual experiences – it may be worthwhile to address parenting, and parent-child dyads using such a chatbot

Table 1: Overview of ideas generated during ideate step of workshop

For example, the participants agreed that, in general, the chatbot should keep the session under 10 minutes, be sex-positive, allow users to ask their own questions, utilize affirmations, and leverage basic motivational interviewing techniques. They also proposed a list of topics that the chatbot can address, as well as different resources that users can be directed to for information and support. Finally, they also pointed out content from existing national health campaigns and applications that have the potential to be adapted as activities on a conversational platform.

The participants also devised an interaction in which different ideas (or activities) are carried out in sequence. For example, the chatbot can begin by introducing itself and its goals, probing users about their motivation for using the application, and can gather personal information that can be used for tailoring the rest of the interaction. Suggested activities, such as quizzes, scenarios and interactive stories, and tailored advice for chosen topics, were considered as non-intrusive, engaging and educational ways to increase awareness of positive sexual- and relationship behaviours

while supporting user autonomy. Furthermore, akin to a human counselor, the chatbot could initiate and support goal setting and pursuit for couples, and encourage users to reflect on their experience and learnings. Importantly, all participants agreed on the sequence in which the ideas are presented in the prototype to facilitate an engaging and comfortable interaction.

While this was envisioned as the first of a series of interactions that the couple can have with the chatbot, almost all of the activities were thought of as being also applicable for long-term interactions as long as the chatbot cycled through different content every time.

4.2.2 Design Guidelines.

(1) *Educate and Support, Not Counsel*

The healthcare professionals maintained that it would be best if the chatbot did not interfere too much in the young couples' lives. It was suggested that the chatbot pay particular attention to communication and the fostering of healthy relationships by providing basic support for relationship processes. This means providing encouragement, support and helpful advice such that the couple is able to take action on their own.

Importantly, it was recommended that the chatbot should not conduct 'counselling' or provide complex help or advice, as this was deemed out of the chatbot's scope and capabilities. That said, the professionals offered that the chatbot can make use of basic motivational interviewing techniques such as affirmations, reflections, asking for permission and asking for feedback as a way to engage and uplift users.

The goal is to create a fun, non-awkward experience for couples to learn and explore topics together. The chatbot should allow the couple to learn about topics relevant to their relationship and sex life, and to do so as a couple. To that end, the chatbot can provide basic information and suggestions on how to approach different topics, both health and relational, with their partner. It may also be useful to allow individuals to ask their own questions, or ask follow-up questions to information presented by the chatbot. Importantly, the chatbot should not exist in a vacuum - it can and should engage in heavy signposting by connecting the users to important healthcare resources that they may or may not know about. This can include redirecting them to relevant health organizations, as well as trustworthy websites and online tools, as well as pointing out exactly where, for example, they can make an appointment or receive contraception.

(2) *Holistic Sexual Health*

It was essential that the chatbot be sex-positive. That is, it should emphasize that sex can be both fun and safe, and not solely focus on safe sex. This led into a set of topics beyond safe sex that the professionals thought would be important for young couples to become aware about, including communication, negotiation, boundaries, pleasure, and self-exploration.

(3) *Features Should Engage*

In their experience, young people respond well to stories and scenarios which depict characters they can relate to. It

was suggested to make use of stories that depict different ways of approaching situations and their consequences to help users understand the right strategy to use in their own relationships. The participants made a reference to an existing serious game that leveraged interactive video-based stories about different relationship and sexual health topics in which individuals can take on the role of a character and make choices that influence the outcome of the story.

The entire group agreed that *gamification* is an approach that works particularly well to keep young people engaged. It was emphasized that the games did not need to be complex. For example, quizzes in which users can compete against each to answer questions correctly were seen as a good way to impart knowledge about a myriad of topics. Simply taking turns to ask each other questions, ranging from casual to personal, was also proposed as a way for the couple to get to know each other better in an attempt to reduce awkwardness, increase comfort and boost relational closeness.

Importantly, it was recommended that, where possible, the chatbot should leverage highly visual elements and interactive media to increase engagement. This referred to videos, (info)graphics, visualisations and animations, and even social media content, to capture and maintain young people's attention.

5 DISCUSSION

In our study, we conducted user-centred design with young people and sexual healthcare professionals towards the development of a couples-based chatbot, or conversational agent (CA) to promote sexual health in new, young couples. Specifically, user interviews were conducted with young people, input from which was fed into a design thinking co-creation workshop that was conducted with sexual health professionals. We presented a set of design guidelines from the perspective of each stakeholder, as well as a description of the design process and artefacts that emerged during the workshop. Below, we reflect on the overall user-centred design process and outcomes.

5.1 Reflecting on design guidelines

The design guidelines that emerged from both stakeholders led to a better understanding of how the CA should behave. While we involved the two stakeholders at separate stages of the process, it was interesting how their perspectives aligned closely. It was emphasised that the main purpose of the CA should be to educate and encourage communication between couples, and not to actively counsel couples or address sexual health-related behaviour change. This is consistent with the study by [40] which found that chatbots for sexual health were more acceptable for receiving information but not for situations which called for deeper understanding and empathy. Furthermore, both stakeholders agreed that the scope of the CA should extend beyond condom use and safe sex; consistent with the needs of young people for digital sexual health interventions [7], it was recommended that the CA should take a more holistic approach and address topics such as relationships and sex-positivity to increase its relevance and usefulness. It may also make it less awkward to discuss the notion of using the CA with a

~ 5 to 10 minutes		Sex positivity	Q & A functionality	Affirmations for empowerment	Motivational interviewing	
Chatbot Introduction	Screening questionnaire	Quiz (optional)	“What would you like to talk about?”	Goal setting	Reflections	Takeaways
“Why brings you here?”	[used for tailoring interaction]	Myths and facts Get to know each other	Provide a list of topics Tailoring (e.g. gender) Provide information Provide concrete tips for communication that are light, casual and not awkward Use scenarios as an objective lens into sexual behaviour Ask what they would do Discuss sexual “house rules”	Agreeing on a relationship goal What do they need to do next?	Ask if they got what they wanted or anything useful Did you... • Explore your sexual health? • Learn something? • Receive useful information? How would you rate this interaction?	Provide downloadable including any links
<p>SH topics:</p> <ul style="list-style-type: none"> • All about condoms • Sexually transmitted infections • Pleasure • Having good sexual experience <p>Communication topics:</p> <ul style="list-style-type: none"> • Self-reflection • Learning about boundaries • Conveying likes and dislikes • Saying “no” • Reading signals and consent • Misconceptions about relationship dynamics, roles and expectations 						
					<p>List of relevant organizations and their websites: GGD (https://www.ggd.nl/), Soa Aids (https://www.soaaids.nl/en), Rutgers (https://rutgers.nl/), and sense (www.sense.info)</p> <p>Reference to ‘Can You Fix it?’ online interactive game</p>	

Figure 1: Prototype proposed by participants during prototype phase of workshop

new partner if it was not solely focused on safe sex, which was an additional concern raised by the end-users, and consistent with adolescents’ pronounced feelings of awkwardness, self-consciousness and lack of confidence [22]. The agreement between the two stakeholders provides support through convergence for the validity of the design guidelines identified for this CA.

Young people advocated the use of a triadic group chat, similar to the CA designed in [63]. While dyadic chats have been used and were received favourably in prior studies [53, 61, 63], the users in this study held a strong disregard for dyadic chats in which the chatbot would talk to each person individually. In addition to having concerns about what their partner would share without their consent, they also voiced suspicions about the CA’s potential role and (ill)intentions. It is likely the case that context influences the role users want the CA to adopt. For example, it could be that young people’s high need for autonomy and self-reliance [41], which has been linked to reduced help-seeking behaviour [45, 60], also makes them more resistant to a CA that takes charge and acts like a mediator because it may be perceived as interfering with their capacity to act on their own, leading to reduced perceived control.

The healthcare professionals, in light of their own experiences with young people, suggested that it was important to present the content in an engaging, interactive manner, and proposed several media through which the CA could educate and inform couples. Examples of these included gamification [9, 28] and interactive storytelling through scenarios [9, 32]. Consistent with the CA designed

in [53], it was also suggested that elements of motivational interviewing can be incorporated to increase engagement, and create a safe and positive atmosphere in which the users feel comfortable and respected. The call to integrate a theory-based counselling approach also supports the potential value of combining top-down and bottom-up approaches to design.

A closer look at the design guidelines suggests that both stakeholders also prioritised the fostering of trust. The triadic group chat, for example, was endorsed as a way to increase transparency while protecting against unknown chatbot intentions. Furthermore, users were concerned that the CA would “interfere” with the couple if it started to mediate their conversations. It has been argued that machines do not possess volitions, moral agency and intentions (yet) – however, CAs are likely to be perceived as more human than, say, a smartphone application, which increases the likelihood that people apply human-like criteria, such as benevolence [34], when deciding if they trust the machine [29]. Another example pertains to the consensus that if the chatbot attempted to engage the couple in counselling or direct behaviour change, it would be perceived as not only outside the realm of chatbot capabilities, but also unhelpful, intrusive and overstepping boundaries. Users tended towards perceiving the CA as more helpful and functional if it operated within its expected capacity i.e. by providing an anonymous and accessible conversational platform to learn about important topics. The findings suggest that trust may play a particularly important role for a couples-based CA that deals with a sensitive domain such as sexual health.

5.2 Limitations

The design thinking workshop was conducted with only one group of four professionals. While the small sample size can be attributed to difficulties in recruiting professionals for such efforts, the findings from the workshop may be difficult to generalize to others in the same group. However, resource-constrained co-creation can often encourage creativity and lead to equally valuable results [46]. Since healthcare professionals can be a hard-to-reach group, future research should find ways to recruit and motivate their participation. Additionally, In this study, it would have also been ideal to include both stakeholders in the same session to facilitate two-way exchanges in which both parties learn from and build on each other. While executing a design sprint involving both groups can be challenging, the inclusion of end-users may have been beneficial in further generating creative ideas and designs. Future studies can benefit from conducting sessions that combine different stakeholders, and inviting them to return to provide multiple rounds of feedback.

5.3 Future Work

The research team intends to use the proposed paper-and-pen chatbot prototype, and the two sets of design guidelines, to design a couples-based CA that promotes safe sex in new, young couples. The next step would be to devise an interaction flow based on the structure and content proposed in the prototype while ensuring that the design guidelines are adequately addressed, particularly those put forward by young people. While there can be challenging to appease multiple groups of people, there was a fortunate and large overlap in the design guidelines that emerged from stakeholders in this study. Points raised that were unique to young people included the desire for a triadic, or three-way, interaction, as well as decreasing the barrier to pitch the use of this CA to their partner – these will become important to incorporate into the design. Once the CA has been designed, it can be evaluated for user acceptability with new, young couples. As this is a novel type of interaction and there is limited research on user needs and preferences for such an application, it could be useful to conduct a qualitative evaluation that provides insight into the couples' experience and perceptions of the CA. The evaluation can also be extended to provide young people with an opportunity to either contribute to, or actively take part in, the redesign of the proposed CA.

6 CONCLUSION

In this study, we described a user-centred design process for a novel couples-based conversational agent (CA) for the sexual health domain. The methodology illustrated the use of user-centred design in a public health context, and even demonstrated the value of a 'one-day sprint' to create value through collaboration. The different stakeholders' perspectives complemented each other; while building trust was important, both groups offered unique solutions as to how the conversational agent could do this. Through user-centred design, the resulting CA is likely to be both acceptable and effective for young people in new relationships. Additionally, the study contributes to the small but growing literature on couples-based conversational agents, and may prove to be a promising starting point for the same in the health domain.

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