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Title: Theorizing eHealth’s working mechanisms through qualitative interviews: Tools to enhance study quality

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Abstract

Introduction: For the next generation of interventions to exploit eHealth’s full potential, they should build on theories of eHealth’s distinct working mechanisms. Interventions have traditionally built on models and theories from other fields: static behavior change theories or face-to-face therapy. However, eHealth interventions are neither static nor do they rely on human contact. Nevertheless, few efforts have thus far been made to identify the distinct working mechanisms of eHealth. We suggest that a promising and pragmatic research method for this purpose is the qualitative interview. However, getting interesting interview data on eHealth working mechanisms can be surprisingly challenging, posing a threat to study quality. Furthermore, there are to date no guidelines for enhancing the quality of such studies.

Objective: This paper’s aim is to (1) describe five inherent challenges to interview studies on eHealth working mechanisms, (2) suggest tools to counteract each challenge, and (3) suggest an explanation for these challenges that also may increase our understanding of eHealth interventions’ unique features.

Methods: We started with the problems encountered in one specific interview study, upon which began an analytic process of looking for underlying causes, abstraction and generalizing. Through comparisons with other studies and consulting the qualitative literature, we agreed upon a refined set of challenges and tools.

Results: We describe five challenges: achieving a joint understanding, not straying off the interview topic, recalling program experiences, seeing through the social interview situation, and mixing applied and basic research. Then we present tools for clarifying and exhausting the research topic, keeping contextual answers short, aiding recall, arranging and analyzing the interview situation, and structuring the dual-aim interview.

Conclusion: We suggest that there may be an underlying cause of these challenges. Presumably, change processes are influenced by the program both through its content and through its interaction with the user (e.g. tailoring, tunneling, providing reminders). However, the program is not seen as an actor, and therefore the interaction is largely invisible. This invisible interaction makes it difficult for the participant to see how his/her change processes have been affected by the program, cloaking its working mechanisms. The suggested interview tools serve to render the invisible person-program interaction visible again, so that the interaction and its influence on the participants' change processes can be explored. The tools offered in this paper may be a step towards more fully developed guidelines to enhance the quality of future studies – which in turn can provide a foundation for field-specific theorizing that can enable program developers to harness eHealth’s distinct working mechanisms in the future.

Keywords: Telemedicine; eHealth; mobile health; telehealth; mHealth; qualitative interviews; interview studies; process research; qualitative methodology; interviewing
Introduction

Building the next generation of eHealth programs will require a shift of attention from the performance of individual interventions to a joint effort in understanding eHealth's general working mechanisms [1,2]. A vast majority of the research published between 1996 and 2013 concerned outcome (74%), while processes were the focus of study in much fewer publications (26%) [3]. As a consequence, the outcomes of specific interventions are well established, but the working mechanisms that underlie these outcomes are substantially less known [4–6].

Instead, knowledge from fields studying interventions with other defining characteristics is applied, assuming that the general principles are transferrable – for example using principles from the rather static traditional behavior change theories [1,2] or from face-to-face therapy [7–12]. However, the interaction between user and program is neither static nor based on human contact. It is therefore possible (or even likely) that the way eHealth programs work and the way other interventions work (such as self-help books or traditional psychotherapy) differ; that eHealth’s working mechanisms are distinct.

The working mechanisms of eHealth can be studied using various methods, but a promising and pragmatic venue of investigation is the qualitative interview; that is, “professional conversations (...) where knowledge is constructed in the inter-action between the interviewer and the interviewee (...) about a theme of mutual interest” [13]. The qualitative interview is a promising method for investigating eHealth working mechanisms because it grants unique access to participants' experiences [14]; and because it is especially suited to explore what is unknown [14], uncover processes, construct theories [15], and build knowledge [16]. Its potential for uncovering important insights about the processes involved in eHealth use has already been demonstrated [17,18]. It is also a pragmatic research method, because many researchers already conduct interviews with program users as part of an applied research goal (developing or implementing an intervention). Through this process, a researcher may sometimes become intrigued by a more basic research question (concerning working mechanisms), and perhaps consider the pragmatic solution of pursuing both applied and basic research goals in the same interviews by simply adding questions to the existing interview guide.

However, most eHealth interview studies fall short in providing the empirical material needed for theorizing eHealth working mechanisms on a more general level. One possible reason for this is that it can be surprisingly challenging to use interviews for studying working mechanisms in a way that generates interesting data (i.e., rich data). This threatens a study’s quality and reach. Another problem is the lack of guidelines – while there are guidelines for developing effective individual interventions [19,20], there are no guidelines for conducting high-quality interview studies on working mechanisms.

Our goal, therefore, was to explore ways of conducting qualitative interview studies of eHealth working mechanisms that produces interesting data. In this paper, we pursue this goal by (1) describing five inherent challenges to such studies, (2) suggesting tools to counteract each challenge, and (3) showing how these challenges form a pattern that may contribute to our understanding of what makes eHealth interventions different from other interventions.
Methods
We arrived at the challenges and tools presented in this paper through a two-step process: in the first step, some of the authors’ experiences with one specific interview study (Study 1, manuscript under preparation) were scrutinized. Thorough analysis of a single, special case can give knowledge that transcends that case [21]. The study’s aim was to explain how the users of a fully automated program for quitting smoking [7] “related” to the program, and to compare this way of relating with what is known as “working alliance” in face-to-face therapy [22,23]. However, early interviews yielded surprisingly little interesting data, and some entire interviews seemingly failed to shed any light on the research question at all. The researchers struggled with a sense of not asking the participants the right questions, and started looking at these early interviews more closely. They identified some potential problems with their approach, the interview guide was revised, and new interviews were conducted. After these efforts, the interviews finally started to revolve around the research question, resulting in interesting and diverse data.

Although the identified problems were encountered in one specific study, they seemed to reflect something more general. The interviews improved by revising the interview guide, suggesting that the problems were not caused by specific characteristics of the study population or the program. Rather, when we looked at what was changed from the original, ineffective interview guide to the revised interview guide, the essence of the problems seemed to be that the participants found it difficult to talk about the program the way the researchers wanted to: to study working mechanisms. To explore this possibility we started what would become step two in the process, which consisted of scrutinizing the original problems, comparing them to those encountered in other studies, and consulting the qualitative literature. The problems were analyzed more carefully to decide what might have caused them, and these causes were abstracted to more generalizable challenges. We then discovered traces of the same challenges in other studies we had been involved in (Table 1). Deciding that this could be of interest to other researchers, we started discussing the challenges and ways to counteract them with other contributors and from different vantage points. Through this process the challenges and tools presented in this paper were refined to their current form.
<table>
<thead>
<tr>
<th>Study</th>
<th>Key intervention characteristics</th>
<th>Description of the interviews</th>
<th>Interest in working mechanisms and problems encountered</th>
<th>Focus of research in publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1: Program for quitting smoking</td>
<td>The digital therapist “Andy” (Norwegian: “Endre”) engages the user in a written “conversation”. Fully automated; dynamically tailored; multi-session follow-up intervention; behavioral target: smoking; population: 18 + who want to quit smoking; technology: web + email + SMS; approach: relational agent, Motivational Interviewing, relapse prevention; where: web; cost: no charge [7].</td>
<td>Semi-structured, individual interviews, some conducted face-to-face, some over the telephone. The interviewer was also one of the program developers. The initial interviews had two goals: getting feedback for program improvement and understanding how the users related to the program.</td>
<td>Interest in potential working mechanisms: How the users related to the program, and comparing this form of “relating” with what is known as therapeutic/working alliance in face-to-face therapy. Problems encountered: All the challenges described in the current paper.</td>
<td>Users relate to the program in two main ways; in either way, they use the program as a means towards gaining change-space and increasing readiness to change (manuscript under preparation).</td>
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<td>Study 2: Website for referring people with problematic gambling to face-to-face therapy.</td>
<td>Through the web site, a non-triaged referral to speak with a counselor was available through direct messaging, free of charge. The goal was to recruit young male online gamblers for face-to-face treatment. Single session intervention; behavioral target: gambling; population: 18 + who want help for their gambling problems; technology: web; approach: self-test, psychoeducation, modelling; where: web; cost: no charge.</td>
<td>Focus groups and individual interviews using the website as stimulus materials. Interviews were conducted face-to-face. The interview guides were developed both to evaluate the acceptability of individual website features, as well as to theorize on users’ motivation to change.</td>
<td>Interest in potential working mechanisms: We wanted to understand the type of motivation that associated with the use of different website features [8]. Problems encountered: All the challenges described in the current paper, except seeing through the social interview situation.</td>
<td>Motivation to change gambling or seek help emerged as two processes including empathy with others, and dissonance from gambling including two sub themes of sports and athletics, and gambling among family (under review) [8].</td>
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<tr>
<td>Study 3: Intervention for reducing at-risk alcohol consumption</td>
<td>The program made use of three embodied guides to program content: the mood coach, the motivation coach, and the willpower coach. Fully automated; some tailoring; multi-session follow-up intervention; behavioral target: at-</td>
<td>Semi-structured, face-to-face, individual interviews plus focus groups. The initial interviews had three goals: getting feedback for program improvement, exploring the acceptance among students and hospital</td>
<td>Interest in potential working mechanisms: To what extent the user experience the program as a person [7]. Problems encountered: All the challenges</td>
<td>Two RCTs of overall effect [24, 25]. Adequate level of feasibility and acceptance was found among students, but also a tendency to define oneself as not belonging to the target group,</td>
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<td>Study 4: Program for quitting smoking</td>
<td>The program communicated to the user as if it were a person. Fully automated; some tailoring; multi-session follow-up intervention; behavioral target: smoking; population: 18 + who want to quit smoking; technology: web + email + SMS + Interactive Voice Response; approach: self-regulation training, supporting self-efficacy, relapse prevention; where: web; cost: no charge [9].</td>
<td>Semi-structured, individual interviews, some conducted face-to-face, some over the telephone. The initial interviews had two goals: getting feedback for program improvement and understanding working mechanisms.</td>
<td>Interest in potential working mechanisms: To what extent the user experience the program as a person ? Problems encountered: All the challenges described in the current paper. Two RCTs on long term efficacy [27, 28], the significance of age for treatment efficacy and intervention adherence. In addition, anecdotal evidence from qualitative interviews that younger participants less often perceived the program as a person [29].</td>
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<td>Study 5: Film intervention to support therapeutic alliance in face-to-face treatment</td>
<td>A short psychoeducative film showing face-to-face psychotherapy situations between a therapist and a young man seeking help for addiction problems. Single session intervention; behavioral target: working alliance in face-to-face therapy; population: 18 + with substance use disorder already in therapy; technology: film; approach: psychoeducation, promoting self-acceptance, cognitive behavioral therapy, mindfulness; where: therapy sessions in an outpatient clinic; cost: no charge.</td>
<td>Individual interviews and focus groups. Interviews explored qualitative aspects of the client-therapist alliance following use of a self-help film in the early stages of addiction treatment. Explore if and how a pre-treatment film may facilitate/support a later working alliance between client and counsellor. Problems encountered: None of those described herein ?.</td>
<td>Patients and therapists accepted or rejected the film as a result of alliance formation and alliance as experiential process. Patients constructed alliances autonomously, while therapists built alliances indirectly through their patients’ experiences [30,31].</td>
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*The interventions are described using a selection of the key characteristics suggested by Bewick and colleagues [32].

* Partly due to the methodological challenges described in the current paper, the focus of study 2 had to be changed during the period between data collection and publication.

* Also partly because of methodological challenges, qualitative findings from studies 3 & 4 were published in channels.
that were not peer reviewed, and do not report on working mechanisms (apart from 60 words of qualitative findings in-between quantitative results [29])

Study 5 did not face the same challenges as the other studies – its focus of investigation was not the program-person interaction, but rather, the client-therapist interaction, with the intervention only seen as a potential facilitator. This is in line with our conclusion that difficulties arise when the target of study is the interaction between a person and the program.

Results

Challenges in getting interesting interview data on working mechanisms

Achieving a joint understanding

Even if the research question is clear and precise, it can be hard to translate it to interview questions in a way that fosters a joint understanding. In Study 1 (Table 1), most participants in the study’s early stage did not talk about their experiences in a way that revealed anything about how they “related” to the program. The interview guide contained questions such as “could you tell me what you thought and felt the first time you used the program” and “could you describe the role the program has had in your quit attempt”. Nevertheless, the researchers struggled with superficial answers (such as “I thought the program was fine”) – until one participant called the program “a secret friend”. The researchers were puzzled. Was this person’s program experience unique? Why did other participants not talk about the program in this way at all?

Meager interview data may indicate a marginal phenomenon - or they may be a result of a research instrument that is not properly calibrated. That is, the interview may fail to gather relevant data that sheds light on the research question. Descriptive interview questions – questions that ask the participant to describe an experience – are often recommended for getting closer to the participants’ own experience [14]. However, without sufficient leads from the interviewer, it may be difficult for the participant to understand which experiential aspects to talk about from a complex and multi-layered experience. In Study 1, descriptive interview questions elicited descriptions of the “wrong” experiential aspects; not the ones that were of the researchers' interest. The interviewer was afraid to put words in the participants’ mouths (asking “do you think of the program as a friend or as a program?” seemed to disqualify any subsequent answer), and that fear hindered clear communication. If the interviewer does not communicate the interview topic clearly and descriptive questions elicit the wrong descriptions, the result may be that interviewer and participant fail to reach a common understanding of what the interview is actually about.

Not straying off the interview topic

Some interviews may seem to be filled with conversation that is relevant, but not at the research question’s core. The interviewer might sense this, but still find it difficult to keep the conversation from straying off. In Study 2 (Table 1), interviews were of patients who had used an online referral site to connect with problem gambling services. However, when conducting individual interviews the interviewer struggled in keeping the conversation focused on the website. Participants talked mostly about their personal history including gambling problems, and when asked about their experiences with the website, they appeared to feel alienated and at a loss. Consequently, there was a lot of interview data on the participants' behavior change efforts – but little data on their use of the website, which was the main focus of investigation.
Information that is central for answering the research question should dominate the interview, and only minimal time should be spent on contextual information. This can be challenging, because the distinction between central and contextual information can be confusing also for the interviewer. In addition, the participant may find talking about certain aspects of his/her experience easier, aspects that may be contextual in the eyes of the researcher. Furthermore, although contextual information should not dominate the interview, it should be included because of its importance for informing the analysis. Failing to strike the right balance between contextual information and the central topic may result in a lot of data that does not answer the research question, and less relevant data to analyze.

**Recalling program experiences**

Sometimes participants do not recall program experiences in sufficient detail to answer the interviewer’s questions. In Study 1 (Table 1), the interviewer asked the participants for a program session they remembered especially well. She was surprised when several participants had difficulties remembering any particular program session at all. This was despite the fact that these participants were getting access to new sessions on a weekly basis at the time of the interview, had completed most of the sessions they had received (as seen from their log data), and felt that they had overall benefited from the program. Still, when asked, no particular sessions stood out.

Using an eHealth program may be an activity that intertwines with everyday life. If so, direct questions on program experiences may not be enough to elicit memory retrieval. Although participants may be active program users at the time of the interview, they are not engaging with the program at that particular moment (unless you are combining the interview with a “think-aloud”-technique, discussed below [33]). That means that in order to talk about program experiences, the participants must retrieve memories. This can be challenging because program sessions may be short, and the participant may use the program in-between his/her other daily business. Consequently, program use may not be encoded as distinct episodic memories [34] to begin with, but rather, these memories may be intertwined with other memories of everyday life. When the interviewer asks specifically for program experiences, his/her question may not contain the right memory cues [35] to trigger memories of program use, and the participant may seemingly not recall any sessions at all.

**Seeing through the social interview situation**

All interviews are also social situations, and aspects of the social situation will influence the data [36]. In Study 1 (Table 1), a female interviewer interviewed a male participant, wishing to understand how he “related” to the program. The interview was somewhat disappointing; the participant’s answers were short and the topic was exhausted quickly, resulting in a brief interview. It was not until later that the interviewer became aware that she subconsciously had been afraid of the participant’s judgement; that he would perceive her as a “typical woman”, valuing emotions (“relating”) over facts (the “actual” program). This subconscious fear had caused her to rush through the questions (which she during the interview had found awkward), partly answering some of them on behalf of the participant, and ending the interview early. Listening to the recording confirmed this suspicion: although the participant’s answers had been short, the interviewer had contributed to the briefness of both the answers and the interview.

Social aspects such as roles and stereotypes can have a negative influence on the analysis - if the data are analyzed as if they only represent the participant’s eHealth experience. Roles and stereotypes can influence both the course of the interview and what the participant wants to talk about. The course
of the interview in Study 1 was influenced by certain salient roles ("woman" and "man") and their associated stereotypes ("emotion-driven" versus "reason-driven"). Similarly, in Study 3 and 4 (Table 1), participants had no difficulties in talking about the program they had used, but some seemed to withhold negative program experiences – perhaps because they thought the interviewer also was one of the program developers (which he was not). If the participant perceives the interviewer to have two roles (as a clinician or a program developer in addition to being the interviewer), it may influence which parts of their experience they want to talk about.

**Mixing applied and basic eHealth research**

When applied and basic research goals are mixed in the same interview study, getting interesting data on working mechanisms can be additionally challenging. In Study 1 (Table 1), early interviews had both an applied research goal (getting feedback for improving the program) and a basic research goal (understanding how the participants “related” to the program). The interviews started with questions addressing possible sources for program improvement (participants’ likes/dislikes, specific program elements). As the interview progressed, questions on how the participants related to the program gradually increased in number (“Has the program ever made you happy”, “Have you ever been upset by the program”). The researchers discovered, however, that most participants would answer interview questions on how they related to the program short and superficially. This impression was confirmed during initial analysis, when the researchers realized that there was a lot of data to answer their applied research question, but little data for answering their basic research question.

Mixing applied and basic research aims can be problematic because different aims may require different interviewing modes. We suggest that the problem arises if the transition between the different modes is not explicit to both the interviewer and the participant. For the interviewer, changing from an applied interviewing mode to a basic interviewing mode will change the point of focal attention; that is, what to listen for and which follow-up questions to ask. For the participant, changing interviewing modes will change how he/she is expected to answer, from talking more superficially about the breadth of his/her program experiences to talking in depth about a few aspects. We suggest that problems arise if the transition between these interviewing modes are not explicit to both the interviewer and the participant. Unclear transitions may mislead the participant to answer interview questions with the wrong “mindset” - basic interview questions as if they were applied or applied interview questions as if they were basic. Furthermore, unclear transition may cause the interviewer to miss important leads in the participant’s answers because his/her attention is split between two research questions.

**Tools to enhance study quality**

**Clarifying and exhausting the topic**

An interviewer can use several tools to clarify the interview topic and foster a joint understanding of the interview topic. One such tool is vignettes; vivid, exemplifying prose stories that guide the conversation towards a particular aspect of the participant’s experience [37–40.] The interview vignette is constructed before the interviews and included in the interview guide. It can be based on a participant account, on relevant literature, or on the researcher’s current understanding of the processes under study. The interviewer might introduce the vignette by saying that he/she wants to share a story with the participant. After recounting the vignette, the interviewer can ask for the participant’s reactions and ask follow-up questions (e.g. if the participant has experienced something
similar as the vignette character, if he/she agrees or disagrees with the main character, etc.). Using several vignettes in the same interview can be a useful way of illustrating different perspectives on the research topic. This will implicitly communicate to the participant that all answers are acceptable, ensuring that the vignettes function to guide the conversation, but not restrict the answers [37,38].

Another and more direct way of fostering joint understanding of the interview topic is to involve the participants as co-researchers, or epistemic interviewing [14,16,41,42]. In traditional qualitative interviewing, participants describe their subjective experiences and the data are analyzed and interpreted afterwards by the researcher [14,16]. In contrast, a co-researcher design entails that the researcher shares his/her current understanding of the research topic and asks for the participant’s views, and the questions are investigated in collaboration. Thus, much of the analysis and validation is done in the interview [16,42]. This changes the roles of the interviewer and the participant: the interviewer becomes a sort of participant and the participant becomes a sort of researcher, both trying to understand the research topic at hand.

Co-researcher designs and vignettes foster clearer communication, but if the researcher initial presumptions are allowed to dominate it can threaten the study’s validity. To ensure that these tools strengthens the quality of the study, the researcher should remain curious and practice reflexivity [43,44]. The interviewer should adopt what in psychotherapy is known as the “beginners mind” [22]: remaining curious and receptive, open to all possibilities. Furthermore, the interviewer must throughout the research process practice reflexivity [43,44]; that is, considering how he/she may be affecting the study with "thoughtful, conscious self-awareness" [43]. Reflexivity about for example preunderstandings, motivations, and the influence of previous experiences can lead to important insights [43]. Reflexive insights that could be of importance for analysis should be documented (e.g. through memos/notes) [15,43,44]. Finally, documented reflections should be made part of the analysis and be made explicit to the reader [43].

A final tool to clarify and exhaust the interview topic is to use follow-up interviews with individual participants. A follow-up interview gives both the interviewer and the participant an opportunity to reflect on what was talked about in the first interview, allowing new insights or aspects to emerge [45]. It also gives the researcher an opportunity to clarify questions or test interpretations with the participant directly [42], giving more nuanced data and enhancing validity.

Recall Study 1 (Table 1), where initial interviews gave meager data on how the participants "related" to the program and there seemed to be a lack of a joint understanding of the interview topic. The interview guide was revised to include vignettes and involving the participants as co-researchers. The vignettes illustrated three different ways of relating to the program, from thinking to the program as a "friend" to seeing it entirely as a "thing". The interviewer also started involving participants as co-researchers. The interviewer would offer her current understanding, describing different ways of thinking about and feeling towards the program. Then she would ask for the participants’ reactions and reflections. Participants would sometimes react with recognition; at other times challenge the interviewer’s ideas. In addition to using a co-researcher design and vignettes, some participants were interviewed twice to allow for clarification of unclear aspects. These methodological changes led to interesting data that brought forth nuances and informed the research question.

Keeping contextual answers short
The interview conversation can be kept from straying off the research topic by identifying contextual
information and using in-interview questionnaires to keep contextual answers short. We find it helpful to facilitate the distinction between focus and context by thinking of eHealth working mechanisms in terms of a triangle (Figure 1, adapted from Moen and Middelthon's discussion of interviews [46]). We argue that the analysis of any eHealth working mechanism must consider all three triangle endpoints: program use, attributes of the participant, and the target behavior. However, the relative importance of each triangle endpoint will vary according to the research question, making some parts of the triangle central and other parts contextual for the investigation.

Figure 1. eHealth working mechanisms involves an interaction between person, program, and behavior.

Once the researcher has clarified what is central and what is contextual, contextual answers can be kept short by using an in-interview questionnaire. The questionnaire can include questions addressing contextual issues (such as “How long have you been worried about your drinking” and “Have you tried reducing your alcohol consumption before”), together with any other questions that might serve as relevant analytic background (such as demographics). The interviewer may fill out the questionnaire together with the participant during the interview, for example at its beginning or end. Using a piece of paper to fill out the answers will help keep the answers short, by providing limited space and communicating a wish for answers that the interviewer can write down. Short contextual answers will in turn leave more time for the central interview topic.

Recall Study 1 (Table 1), where the research aim was to describe how users “related” to the program. The central aspects were considered to be the program (as experienced by the participant) and the participant (specific attributes that might influence their way of relating). The participant’s quitting process was considered contextual information; that is, an aspect that might influence his/her way of relating. Therefore, information about the participant’s quitting process had to be included in the interview, but should not be its main topic. However, in early interviews, stories of quitting smoking often dominated, presumably because these were the stories that the participants were ready to tell.
Therefore, in the revised interview guide, questions about the participants’ quitting history were included in an in-interview questionnaire. This significantly reduced the amount of time spent on the participants’ quitting history, leaving more time for the central aspects.

**Aiding recall**

Problems in recalling program experiences can be amended by moving the experiences into the interview situation through a think-aloud procedure [33]. In a think-aloud procedure, the participants go through (parts of) the program during the interview, while the interviewer instructs the participant to “think aloud”, reporting all thoughts without censoring them [33]. The flow of thoughts should not be interrupted, and follow-up questions should be saved for after the think-aloud procedure is completed [33]. However, there are some limitations: if the program consists of more than just one website or session, the researcher cannot use the think-aloud procedure to go through all program content. Furthermore, for some research questions, the interviewer’s presence might interfere with the working mechanisms under study. However, if these issues do not apply, the think-aloud procedure can enable a researcher to study possible eHealth working mechanisms as they happen, potentially removing the problem of recall.

Another tool for aiding recall is asking memory-facilitating interview questions [35]. As suggested previously, in some instances, program experiences may not be sedimented as specific episodic memories (because program use is entangled with other everyday activities). If so, the interviewer’s phrasing of questions becomes increasingly important. The interviewer’s words influence the participant’s memory-retrieval process by serving as memory cues [35]. The interviewer’s choice of memory cues can be guided by first mapping the participant’s program habits. This knowledge can be used to phrase questions in ways that contain memory cues; reflecting what the participant was doing, where he/she was, and his/her emotional state at the time of the experience [35]. Memory-facilitating interview questions can help the participant to recall program experiences that are intertwined with other memories from everyday life.

As a final note on program recall, it may not be necessary for the participant to remember any particular program session. The researcher must consider what level of detail is necessary to answer the research questions meaningfully. For some research questions, the sum of program experiences may be more important than any particular experience. If so, using the interview to discuss the significance of this experiential sum can be more meaningful [45].

**Arranging and analyzing the interview situation**

The negative effect of social aspects such as roles and stereotypes can be minimized through the researcher acknowledging their potential influence, before and after the interviews. Before an interview, researchers should reflect on what social aspects may be of significance, and whether it is possible to do something about them. If circumstances can make the interviewer appear as a clinician or a program developer, the interviewer may try to change these circumstances on beforehand; for example by changing the interview location or considering how to dress or talk [44]. Alternatively, these issues can be addressed explicitly in the beginning of the interview. During the interview, the interviewer should try to monitor the social exchange [44], making notes of elements that may be impacting the conversation. After the interview, anything that might be of importance to the analysis should be documented [43]. These notes should be included somewhere easily accessible (e.g., in the interview transcript or in a separate document) and analyzed as data that might inform, confirm, or
The complexity of the social interview situation may disturb the data gathering process, but it could also be an asset. Through the interviewer’s reflexivity, the social situation may generate insights that would otherwise be missed. For example, instead of seeing the “emotional woman”-interview of Study 1 as a failed interview, the researchers considered it as empiric material highlighting a possible aspect of how people “relate” to a program; namely, that relating to a program may go against social norms and produce feelings of embarrassment (in this case, as felt by the interviewer).

**Structuring the dual-aim interview**

Interviews with both applied and basic research aims may serve both aims through topical blocks and clear introductions. The transition between applied and basic interview modes can be made easier by structuring the interview in topical blocks [47]: one covering the applied research question, another covering the basic research question. Topical blocks enable the interviewer to keep a singular point of focal attention at a time, making easier the process of listening and choosing following-up questions. Only one topic should be discussed at a time, so if the participant says something relevant for research question two in the topical block of research question one, the interviewer’s follow-up questions on this should be saved for afterwards. The transition between the different topical blocks should be made explicit to the participant through introductions: first by a general introduction to the interview and then with separate introductions preceding each topical block. The introductions can even specify the interviewing modes and what they imply to the participant; for example that the applied topical block involves factual questions and answers, while the basic topical block involves a co-researcher design. Through structuring and using introductions, both participant and interviewer are helped into the right frame of mind, moving from one research question to another.

Recall Study 1 (Table 1), where there was a lot of data to answer the applied research question and meager data to answer the basic research question. The revised interview guide was structured in two topical blocks: first a block with questions asking for feedback for program improvement (applied research question), then a block with questions asking how the participant “related” to the program (basic research question). The interview structure was made clear at its beginning, and each block was introduced with a short instruction. This made it easier for both the interviewer and the participant to focus on one task at a time, and generated more data on the basic research question. Additionally, the interviewer could now be sure that both research questions were covered, illustrating a second advantage of interview structuring: it ensures that the conversation covers both the applied and the basic research question, instead of leaving this overview for analysis.

**Discussion**

Little work has been done to identify the distinct working mechanisms of eHealth. Qualitative interview studies can spark insight into eHealth working mechanisms in ways that other data collection methods do not provide, through their explorative nature and by utilizing participants’ expertise [13,15]. However, despite the promise of qualitative interviews, getting interesting interview data on eHealth working mechanisms can be surprisingly challenging, leaving little data to analyze. Meager interview data can threaten the quality of such studies as well as their ability to contribute to knowledge beyond the individual intervention. Still, currently there are no guidelines to help improve the quality of interview studies of eHealth working mechanisms. In this paper, we have identified five challenges that may be inherent to such studies, because none of the challenges are
bound to the specific intervention, problem behavior, or target population. We have also suggested tools for counteracting these challenges. However, there may be a reason why eHealth’s working mechanisms are difficult to access through interview studies.

This reason may become clearer by comparing eHealth programs to a different intervention: a therapist. Psychotherapy’s working mechanisms can be said to consist of two main elements: what goes on between the therapist and the client in the therapy session – the interaction – and how this interaction influences the client’s internal change processes. The interaction itself can be said to consist of two main elements: its’ content (the “what” of the interaction) and its’ processes (the “how” of the interaction). But people do not only interact with other people; things also “act” in that their properties influence a course of action [48], and people inter-act with them. A person reading a self-help book is not alone in acting; the book contributes to the interaction by providing its’ content, and this interaction influences the help-seeker’s change processes. Hence, the working mechanism of any intervention can be said to consist of its’ interaction with the help-seeker, and the influence this interaction has on the help-seeker’s change processes (Figure 2).

Figure 2. Working mechanisms of a behavior change intervention.
While a book’s contribution to the interaction is limited to the interaction’s content, an eHealth program influences the interaction both through content and through interactional processes. For example, a program may remind the user to log on (attempting to influence when and how often the interaction will take place), or it may respond to user input through tailoring (influencing how the interaction unfolds). However, most people do not think about programs as interacting agents, but rather, as things with a content. Because the program is not seen as an agent, the person may misinterpret what are in fact processes occurring in the person-program interaction as purely intrapersonal processes, rendering the interactional processes largely invisible (Figure 3). This makes researching working mechanisms in eHealth difficult, because it is precisely these interactions and the intrapersonal processes that go along with them that constitute the working mechanisms of eHealth programs.

Figure 3. Working mechanisms of an eHealth intervention.

This would explain why achieving a joint understanding of the interview topic can be difficult. If the participant sees the person-program interaction as an intrapersonal process, the program’s role will be invisible. Hence, descriptive interview questions encouraging the participant to describe his/her program experience will not facilitate new reflections on the program’s role; it will only result in more of the same, conscious experience. However, vignettes offer the participant a different perspective to his/her experience. Alternatively, through a co-researcher design, the interviewer can test his/her understanding directly with the participant, and they may discuss the program’s role from different angles together. Furthermore, through follow-up interviews, the new perspective offered by the interviewer can mature, and both the participant and the interviewer may gain a deeper understanding. Making the invisible person-program interaction visible again allows the participant to see the program as a more active partner than before, giving the researcher a deeper understanding of the interactional processes, and of how these processes affect the participant’s change processes.

In order to allow time for joint exploration of the person-program interaction, it is necessary to limit
the time spent on contextual aspects. As discussed earlier, we suggest that working mechanisms should be seen as operating in the interaction between the program, the user, and the behavior change. However, the invisible program-person interaction may cause the participant to underestimate the program's role in the change processes. This may cause the participant to talk about the change processes in isolation of the program (talking less about the program), or to talk about the program in isolation of the change processes (talking about the program as a thing instead of an agent). Questionnaires can help restore the conversational balance, leaving more time to explore the invisible interaction.

Even if the person-program interaction is brought to center stage, its former invisibility may result in problems with recall. Aspects of the program-person interaction may simply not have been noticed consciously by the participant, making them difficult to recall. Memory-aiding questioning may facilitate recall of specific program experiences, which can serve as starting points for further questioning and reasoning. Alternatively, a think-aloud procedure can give the interviewer “live” access to the person-program interaction. However, we believe it should be used with consideration, because the interviewer’s presence may draw attention from the program’s role in the interaction. That said, used with care and for certain working mechanisms, the think-aloud procedure can also bring the interaction more to the foreground and minimize problems of recall.

The social situation of the interview might further contribute to the invisibility of the person-program interaction. The interviewer’s presence may cause the participant to perceive the interviewer as the opposing agent, pushing the person-program interaction to the background. Seeing the interviewer as a clinician may cause the participant to think of him/her as a therapeutic interactional partner, and to be less attentive to the program. Similarly, seeing the interviewer as a program developer may highlight the program as a thing, something made by someone else, making it more difficult to see the program’s role as a therapeutic agent. However, the interviewer’s awareness of these possibilities may in itself counteract their negative effects; the interview situation can include the participant, the program, and the interviewer all as potential agents.

Finally, the invisible person-program interaction may also explain the challenges with mixing applied and basic eHealth research. In applied research, the program is treated as a thing, while in the search for basic working mechanisms the program must be seen as an agent contributing to the person-program interaction. This problem is solved by structuring the interview, and by clear introductions.

Studies mixing basic and applied research aims may become an advantage to the field, if the basic sub-study is of sufficient quality. As discussed earlier, including basic research questions to existing applied interview studies is a pragmatic solution. Thus, increasing this practice will presumably result in more basic studies than if all basic research were to be conducted separately. We believe that combining applied and basic research will advance our knowledge of eHealth’s distinct working mechanisms, as long as researchers are aware of the potential challenges to such studies and make use of appropriate tools to enhance study quality.

In conclusion, interview studies of eHealth working mechanisms may have inherent challenges. In this paper, we suggest that these challenges arise from a specific feature of eHealth treatment; namely, that the person-program interaction is largely invisible to the participant. The invisible interaction may make it difficult for relevant program experiences to be remembered and articulated, posing difficulties in using interviews to get interesting data on eHealth working mechanisms. We have
suggested some tools for rendering the invisible interaction visible again: clarifying and exhausting the interview topic (through vignettes, co-researcher design, and follow-up interviews), keeping contextual answers short (through interview questionnaires), aiding recall (through think-aloud procedures or memory-aiding questioning), arranging and analyzing the interview situation (through being aware of social aspects and including reflective notes in the analysis), and structuring the dual-aim interview (through topical blocks and block introductions). These tools may serve as a step towards a set of guidelines for conducting interview studies on working mechanisms. Future guidelines may suggest how interview studies can be conducted to produce more interesting data, allowing for analysis that is more thorough and enhancing study quality. Insights from high-quality studies can in turn be used to build more general, theoretical knowledge about the working mechanisms of eHealth. The invisible person-program interaction may itself be a feature of eHealth’s working mechanisms that merits further research. The unique position of eHealth interventions as something in-between static self-help and personal psychotherapy – an active therapeutic agent without a human counterpart – is an example of a feature that may be harnessed in future interventions. Through theorizing the general working mechanisms of eHealth interventions we believe that the next generation of eHealth programs can be built to fully take advantage of this medium’s potential.

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Conflicts of Interest
None declared.

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