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Getting Change-Space: A Grounded Theory Study of Automated eHealth Therapy

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Abstract

A promising tool for bettering people's health is eHealth (or "mHealth") programs: fully automated, web-based health interventions. However, we know surprisingly little about eHealth's working mechanisms. One possible working mechanism is that program users benefit from a collaborative "relationship"—a "working alliance"—with the program. Although evidence support the existence of a person-to-program alliance it is unclear if and how it influences change. Therefore, we conducted a grounded theory study of how relating to an eHealth program for quitting smoking influenced the participants' change processes. The ensuing model focuses on how participants got change-space—feeling free from social forcing and able to work constructively on changing—and how the relational processes "making come-alive" and "keeping un-alive" were instrumental in this process. By presenting evidence that relating may influence change in automated therapy, this study supports the person-to-program alliance as a working mechanism in eHealth.

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A Grounded Theory Study of Automated eHealth Therapy

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A promising tool for bettering people's health is eHealth (or "mHealth") programs: fully automated, web-based health interventions. However, we know surprisingly little about eHealth's working mechanisms. One possible working mechanism is that program users benefit from a collaborative "relationship"— a "working alliance"—with the program. Although evidence support the existence of a person-to-program alliance it is unclear if and how it influences change. Therefore, we conducted a grounded theory study of how relating to an eHealth program for quitting smoking influenced the participants' change processes. The ensuing model focuses on how participants got change-space— feeling free from social forcing and able to work constructively on changing— and how the relational processes "making come-alive" and "keeping un-alive" were instrumental in this process. By presenting evidence that relating may influence change in automated therapy, this study supports the person-to-program alliance as a working mechanism in eHealth. Keywords: Working Alliance, Therapeutic Alliance, E-Alliance, eHealth, mHealth, Telehealth, Grounded Theory, Qualitative Research

The future holds great promise in improving people's health through technology; online, automated health interventions seem effective in preventing and treating a variety of mental and physical issues (Barak, Hen, Boniel-Nissim, & Shapira, 2008; Deady et al., 2017; Shahab & McEwen, 2009). It is therefore quite surprising that little is known how these automated health interventions *work*. Currently, these interventions—often called "eHealth" or "mHealth" programs—are developed with little verified knowledge of their effective ingredients or working mechanisms, and there are few if any eHealth-specific theories that specify how automated, interactive therapy facilitates change (Danaher, Brendryen, Seeley, Tyler, & Woolley, 2015; Hekler et al., 2016; Riley et al., 2011; Webb, Joseph, Yardley, & Michie, 2010). Understanding how eHealth programs facilitate change would undoubtedly improve our ability to develop more effective programs; thus, there is a need for research that can inform eHealth theories and uncover eHealth's working mechanisms (Hekler et al., 2016; Riley et al., 2011).

One possible working mechanism that has been suggested is that program users may form some sort of collaborative relationship to the eHealth program; a person-to-program working alliance (Barazzone, Cavanagh, & Richards, 2012; Baumel, Faber, Mathur, Kane, & Muench, 2017; Bickmore, Gruber, & Picard, 2005; Cavanagh & Millings, 2013; Clarke et al., 2016; Kiluk, Serafini, Frankforter, Nich, & Carroll, 2014). The working alliance between client

and therapist is usually considered to comprise three elements: agreement on the goals of therapy, agreement on the therapeutic tasks towards that goal, and an emotional bond (Bordin, 1979; Doran, 2016). A strong working alliance is considered to be important in psychotherapy (Barber, Connolly, Crits-Christoph, Gladis, & Siqueland, 2009; Flückiger, Del Re, Wampold, Symonds, & Horvath, 2012; Horvath & Symonds, 1991); this, combined with the similar role of therapists and eHealth programs in helping people change, makes it pertinent to consider the working alliance as a possible eHealth working mechanism.

Indeed, there is some evidence supporting the existence of a person-to-program alliance. Two studies of two different eHealth interventions assessed alliance with an adapted version of the Agnew Relationship Measure (ARM; Clarke et al., 2016; Ormrod, Kennedy, Scott, & Cavanagh, 2010). Both studies report that participants scored above the neutral midpoint of the ARM-subscales, which is interpreted as an indication of a person-to-program alliance. A third study of people with cocaine-dependency randomized participants to either treatment as usual with a clinician (TAU) or TAU plus an automated eHealth program (Kiluk et al., 2014). Participants in the TAU condition were compared with participants in the eHealth condition with respect to alliance; alliance to the clinician was measured with the Working Alliance Inventory (WAI), while alliance to the program was measured with an adapted version of the WAI ("WAI-Tech"). They found that the WAI-Tech showed similar psychometric characteristics as the WAI, with similar internal consistency, mean scores, and stability over time; however, participants consistently scored lower on the bond-subscale of WAI-Tech. Thus, although the similar psychometric characteristics support the existence of a person-to-program alliance, the results raise questions concerning the emotional bond. Moreover, none of these three studies found an association between alliance and change (Clarke et al., 2016; Kiluk et al., 2014; Ormrod et al., 2010).

Perhaps more compelling evidence is provided by Bickmore, Gruber, et al. (2005), who were able to manipulate participants' alliance-scores experimentally by programming an embodied agent ("Laura") to perform a range of "socio-emotional behaviors" believed to support a working alliance. Laura was incorporated into an automated eHealth intervention for promoting physical activity among sedentary adults. Through randomization some participants were given a program version in which Laura performed these socio-emotional behaviors (relational group); others were given a program version in which Laura did not perform the socio-emotional behaviors (non-relational group). Alliance was measured with an adapted version of the Working Alliance Inventory (WAI). The researchers found that the socio-emotional behaviors performed by Laura (in the version administered to the relational group) was successful in increasing participants' emotional bond to the program. However, they found no association between alliance and outcome.

An association between alliance and outcome was, however, found in another study of a program for depression conducted by Meyer et al. (2015). Alliance was measured with an adapted version of the Helping Alliance Questionnaire (HAQ-11), which measures "the extent to which patients feel that the treatment is helpful, seem to view problems in the same way and seem to share their goals" (p. 51). When controlling for early symptom reduction, the researchers still found a correlation between alliance to the program and subsequent symptom reduction (partial r = .34, p < .02), providing support for an association between a person-to-program alliance and change. However, the alliance-measure used by Meyer et al. (2015) emphasizes helpfulness and seems to disregard an emotional bond. Perhaps not without reason: of agreement on goals, agreement on tasks, and an emotional bond, the emotional bond is arguably the most controversial element of a person-to-program alliance, making it relevant to review research on how people relate to eHealth programs.

Several studies have reported anecdotal evidence of people experiencing positive social emotions in their use of eHealth programs (Bickmore, Caruso, Clough-Gorr, & Heeren, 2005;

Bickmore, Gruber, et al., 2005; Brandt, Dalum, & Thomsen, 2013; Clarke et al., 2016). One particularly interesting study was conducted by Kaplan, Farzanfar, and Friedman (2003). The eHealth intervention was based on Interactive Voice Response, and the participants could call it, upon which it answered with a human voice (recorded by an actor). The participants could respond by pressing numbers on the keypad. The researchers interviewed the participants and concluded that they formed one of three types of relationships to the program: "feelings of love," "feelings of guilt," or "ambiguity or ambivalence." However, based on the provided data excerpts it seems that "feelings of love" may be an over-statement which fails to capture possible nuances in the participants' emotional experiences. Moreover, the authors do not discuss their categories against the alliance-concept, limiting the study's theoretical implications. Finally, none of these qualitative studies have analyzed whether these ways of relating to the programs have any consequences for change. Thus, although current evidence suggests that it is possible to experience positive social emotions in the use of eHealth programs, it is unclear whether it is meaningful to talk about a person-to-program emotional bond.

The unsettled status of the emotional bond induced us to conduct a grounded theory study of how the users of an automated eHealth program for quitting smoking related to the program (Holter, Ness, Johansen, & Brendryen, 2019). Based on the findings, we suggested a model of relational processes in automated therapy (Figure 1). According to this model, people relate to automated programs through two relational modes: *making come-alive* and *keeping un-alive*. *Making come-alive* involves thinking about the program as another social actor, capable of thinking, feeling, and acting on its' own accord. In contrast, *keeping un-alive* means thinking about the program as an inanimate object, incapable of thinking and feeling. Furthermore, the model separates between two relational situations: thinking *about* the program between sessions and thinking from *within* the immediate interaction with the program (Shotter, 2007). Different combinations of these relational situations and the two relational modes result in three partly overlapping relational types: a non-social interaction, a semi-social interaction, and a semi-social relationship. We found that participants who made come-alive experienced the program as a supportive social presence (because they, in addition to making come-alive, judged the interaction positively). After considering different attributes of this experienced supportive social presence we concluded that it might be called a type of emotional bond, thus strengthening the position of the person-to-program alliance as a meaningful concept.
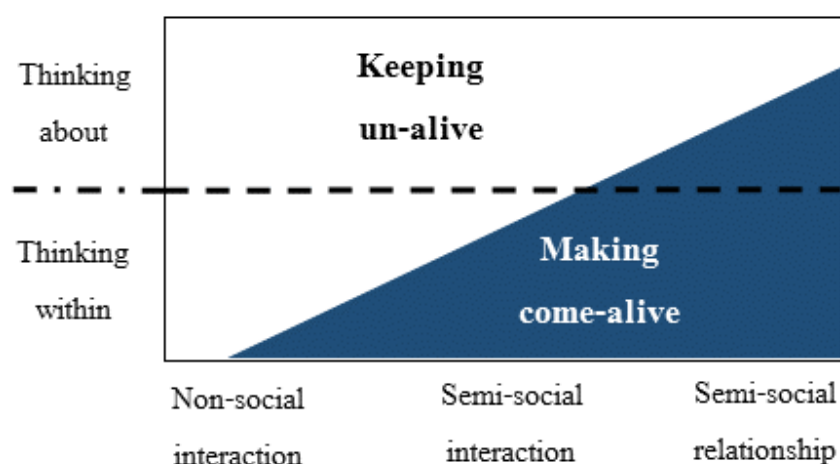

Figure 1. A relational model of relating in automated eHealth therapy consisting of two basic relational modes: making come-alive and keeping un-alive. Adapted from Holter et al. (2019).

However, although evidence suggests that the person-to-program emotional bond is a *meaningful* concept (Holter et al., 2019) this does not necessarily imply that it is a *useful* concept. For it to be a useful concept it must be possible to document that an emotional bond influences change—but so far, researchers have been unable to provide such documentation, whether quantitative (Bickmore, Gruber, et al., 2005; Clarke et al., 2016; Meyer et al., 2015; Ormrod et al., 2010) or qualitative (Brandt et al., 2013; Clarke et al., 2016; Kaplan et al., 2003). Failure to detect an association between a person-to-program emotional bond and change may imply that there is no such association, or it may be caused by methodological weaknesses in the study design. More broadly, because quantitative studies are bound by predefined operationalizations and fixed study designs, they may fail to detect unexpected materializations of a potential person-to-program alliance and associated change-processes. As such, qualitative studies that can take a more explorative approach may be more suitable in this early stage of knowledge production. Thus, the purpose of this study was to explore the interplay between relating and change in the use of an automated eHealth program in a qualitative, grounded theory study. To achieve this, we used the previously developed model of relational processes in automated therapy (Figure 1, adapted from Holter et al., 2019) as our conceptualization of "relating" to answer the following research question: *Do ways of relating to an eHealth program influence change, and if so—how?*

Before moving on to the methods of the study, we will provide the reader with a brief presentation of the context and intensions of each of the authors. This article is part of Marianne T. S. Holter's PhD-dissertation project, which pursues the question of a potential person-to-program alliance from different perspectives, from program design to suitable interview methodology to qualitative studies of relating and change. She has therefore conducted and transcribed all the interviews and was the one most deeply engaged in the details of the analysis. The three other authors (Ottar Ness, Ayna B. Johansen, and Håvar Brendryen) have supervised this work as well as co-written this article. We share a theoretical fascination for the possibility of a person-to-program alliance, which can be said to stem from two different starting points. For the case of Håvar Brendryen and Marianne T. S. Holter, the starting point was the alliance as a potential eHealth working mechanism; Brendryen has researched for 14 years within the field of eHealth and took on Holter as a Ph.D. student onto his eHealth project. Coming from the eHealth-point-of-entry, and with background from social psychology (Holter), human-computer interaction and health psychology (Brendryen), our interest in the potential person-to-program alliance evolved from a drive to understand eHealth's working mechanisms together with what we see as role similarities between a (human) therapist and sophisticated automated eHealth programs. Ayna B. Johansen, who tragically past away before this article was published, had substantial experience from research into eHealth, extensive experience as a clinical psychologist, and a broad interest in human helping relationships generally and the working alliance specifically. Similarly, Ottar Ness has extensive experience with family therapy and mental health recovery processes and has a previous interest in the working alliance from these perspectives. Thus, the starting point of Johansen and Ness was clinical and human relationship-oriented. Together, we found that our interests intersected in this study, in a practical wish to understand eHealth's working mechanisms and a theoretical fascination for the alliance-concept. Another relevant aspect of Marianne T. S. Holter's background is that she previously worked for three years part-time as a counselor at the Norwegian Quit Smoking Line, during which time she was often puzzled by similarities and differences between individual callers. Her experience was useful for building rapport with the participants, and her puzzlements were early seeds of the analysis in this article. Finally, Håvar Brendryen and Marianne T. S. Holter have together designed and developed "Endre" (the program; in English: "Andy"). Already at the design-stage we were curious about the possibility of a person-to-program working alliance, and purposefully designed to (in theory) support such an alliance

(Holter, Johansen, & Brendryen, 2016). This background was an advantage in interviewing and analysis because it gave firsthand knowledge of the program the participants had used, but it also involves a risk of wanting the program to "achieve." We have remained reflexive of this possibility throughout the study and regularly confronted it in reflexive memos; this is accounted for in the validity-section of the article.

Methods

Qualitative Approach and Research Paradigm

We conducted a grounded theory study (Charmaz, 2014) because we were interested in processes (of relating and change), and because the scarcity of relevant theories called for a rigorous and inductive approach. Charmaz' version of grounded theory was chosen because we wanted to retain a flexible approach to analysis driven by the data.

Regarding research paradigm, we believe that the model we present is one of several possible representations of reality. As such, this study was conducted within a critical realist perspective (Houston, 2001; Maxwell, 2013).

The eHealth Program

The eHealth program that we used for the study, "Endre," is a fully automated web-based intervention for quitting smoking. Some of the main program characteristics are summarized in Figure 2 (Bewick et al., 2017).
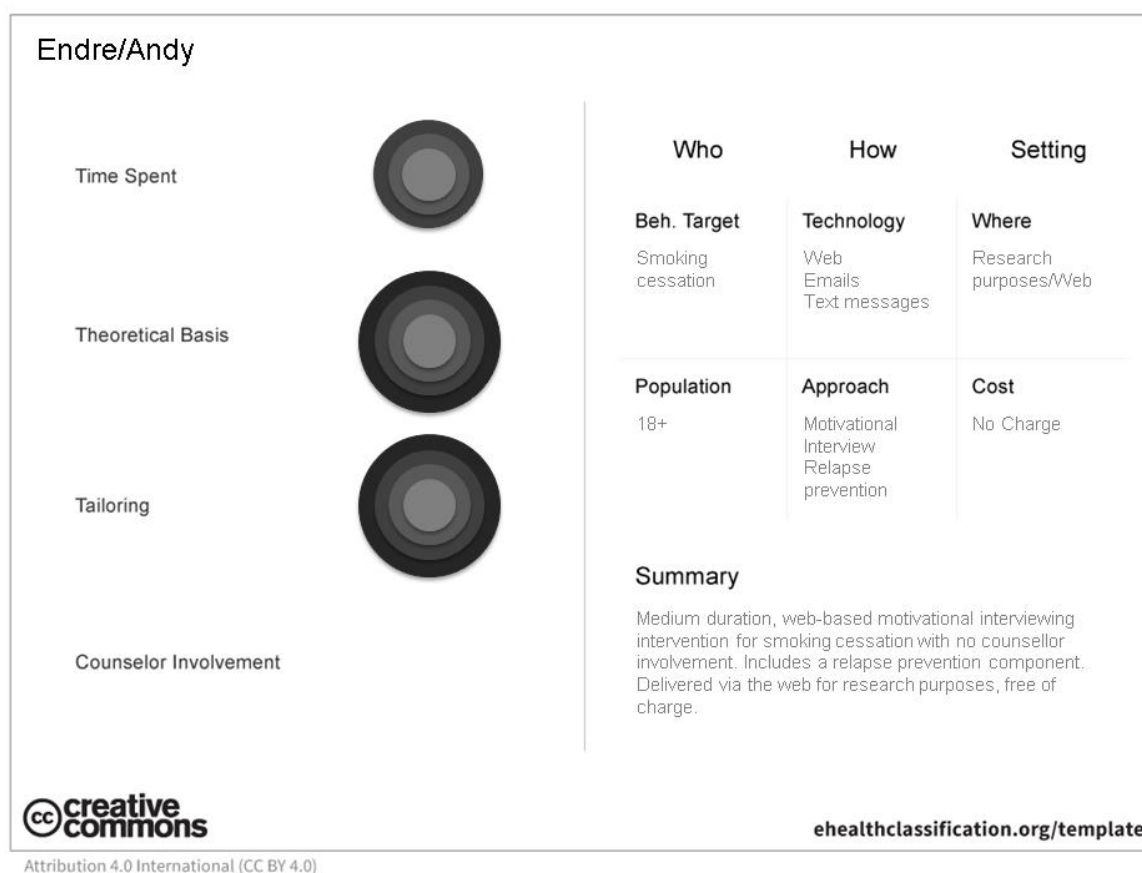

Figure 1. The eHealth program, "Endre" ("Andy"), described by the eHealth classification tool of Bewick et al. (2017).

The original name of the program is "Endre," which in Norwegian is a masculine name also meaning "to change." In this article, we will call the intervention "Andy" in order to make it more apparent to non-Norwegian readers that the program features a relational agent (Bickmore & Picard, 2005). Andy is a medium duration program with a strong theoretical basis, drawing mostly from Self Determination Theory (Deci & Ryan, 2008), Motivational Interviewing (Miller & Rollnick, 2012), and relapse prevention (Marlatt & George, 1984). The program does not involve any counselor support, as it is fully automated. It is designed as a written "conversation" between the program user and Andy, involving an extensive amount of tailoring to individual program use. Each session starts with Andy introducing today's quit-related theme and asking the user a related question, upon which the user often replies through choosing a multiple-choice alternative. The use of multiple choice makes it possible to tailor Andy's response to the user's input, approaching the flow of a conversation and enabling the communication of empathy. Other times the user is asked to provide an answer in a text-box. The system cannot understand this text but uses it to allow for more individualized content (i.e., when the user is asked about his/her most important reason for quitting). Such user-generated text is also on many occasions repeated to the user at a later appropriate stage (i.e., if s/he has had a lapse and considers giving up quitting), increasing the personalization of the program.

Using Andy involves spending 10 days preparing for quitting, with a new session every day, followed by a maintenance phase of maximum 14 sessions over four weeks. The number of sessions each individual user gets is not fixed but tailored to individual preferences and program use. The maintenance phase includes a lapse management component, in which the user is asked every day if s/he has been smoke-free. If the user reports a lapse (i.e., s/he has had a cigarette), s/he is given access to a special relapse prevention session with the purpose of aiding him/her towards a decision (keep quitting or keep smoking), managing the lapse constructively, and making a plan for staying smoke-free. Throughout the program, Andy communicates using computerized Motivational Interviewing (Miller & Rollnick, 2012). A comprehensive description of the program is published elsewhere (Holter et al., 2016).

Participants and Recruitment

The study is based on two samples, one which was interviewed and one which participated through written material ("reflection notes," described below). The study was conducted in Norway, and when recruiting, we asked for people who wanted to quit smoking with the help of a web-based program.

The samples were recruited separately: First, the interview sample (N = 16) was recruited via the researchers' social networks on Facebook, a popular discussion forum in Norway ("Underskog"), and a local GP's office. This sample was diverse regarding gender, age (32-70), and occupational status (including people on long-term sick leave, nurses, construction workers, and people in higher education). The interviewer knew three of the participants peripherally. One participant changed her mind about being interviewed and withdrew from the study.

At a later stage, we decided to include an additional data source: what we call "reflection notes;" that is, written answers collected from within the program (described below). Through a related study on the same eHealth program, we had access to the reflection notes of 112 participants, from which we made a theoretical sample (N = 16) to inform the developing analysis (Charmaz, 2014). These participants were recruited through Healthy Life Centers in Norwegian municipalities, as well as through advertisements on Facebook, Google, and online newspapers. This sample was also diverse, and included women and men 25-63 years old, with different levels of education (ranging from primary school to four years or more at a university).

Data Collection

Interviews. Marianne T. S. Holter conducted the interviews. They were semi-structured and lasted between 35 and 80 minutes. Holter also conducted follow-up interviews with three participants, for whom the initial analysis of the first interview had generated new questions that needed clarification. Approximately half of the interviews were conducted face-to-face, in a location by the participant's choice (e.g., at Holter's office, in the participant's home, at the participant's workplace, and at cafés). The other half of the interviews were conducted by Holter via telephone, because these participants lived in remote locations. All interviews were audiotaped—except for three, in which a recording device for various reasons had not been available. In these three interviews, Holter made detailed notes, and made sure to separate direct quotes from paraphrasing.

The interview guide underwent considerable changes after the first six interviews, because we were not getting sufficiently rich data to answer our research questions. This led us into a process of methodological refinement, in which we tried to understand the methodological problems and sought tools for counteracting these problems (Holter, Johansen, et al., 2019). The final interview guide included interview vignettes (Barter & Renold, 1999; Finch, 1987; Jenkins, Bloor, Fischer, Berney, & Neale, 2010) and epistemic interviewing (Brinkmann, 2007). The interview vignettes were used to illustrate different ways of relating to Andy (the program) and open the subject of relating to the program. Epistemic interviewing was used to facilitate joint exploration of the processes under study, allowing the interviewer to participate more actively in the conversation and to test her emerging understanding with the participant (Brinkmann, 2007). These changes resulted in more productive interviews and richer data.

Reflection notes. As referred to above, we collected what we call "reflection notes" from a separate sample. These reflection notes consisted of the participants' written answers to Andy's (the program's) questions within the program at four different time points. In three of these time points, Andy asked, "How would you describe working with me?" In the final time point, participants were simply asked to provide feedback on the program. The participants answered each question by writing in a text box, typically with 1-4 sentences; this is the material that is referred to as "reflection notes."

Data Analysis

Marianne T. S. Holter performed the analysis, in collaboration and consultation with the other three authors. The analysis was based on Charmaz' version of grounded theory (2014) and can be described as consisting of an inductive phase and a more deductive phase. In the inductive phase, Holter transcribed the audio recordings at what she deemed to be the necessary level of detail for answering the research questions (Bailey, 2008; Bird, 2005) and coded the transcripts inductively with HyperResearch. She then used mind-maps and tables to sort and organize the initial codes (Miles, Huberman, & Saldaña, 2014). In parallel, she wrote case summaries for each participant, summarizing key aspects of the encounter and answering the research questions for each case (Miles et al., 2014). We included these case summaries in an early phase because we considered it important to understand individual trajectories and to get the necessary overview of the relational- and change-processes under study. Holter documented insights, quandaries, and decisions in memos (Charmaz, 2014), and the memos were made part of the analysis and used in writing up the research.

As our analysis took on a sufficiently abstract form, we gradually moved onto a more deductive phase, in which the emerging analysis was tested against data to correct and saturate

the evolving model. From the early analysis, Holter made a first attempt at a model, from which she deduced focused codes. Subsequently, she used these focused codes to recode existing material and code all new material. The early model also pointed towards gaps in our understanding that we filled through theoretical sampling of reflection notes, as well as of specific experiential aspects in interviews (Charmaz, 2014). The model was refined through joint discussion and went through many iterations before we determined that it had reached theoretical saturation; that is, a useful model that could explain all relevant existing and incoming data.

Research Ethics

The Norwegian Centre for Research data ethically approved the study (interview sample: project number 39934, reflection note sample: project number 52874). Prospective participants were given written information about the study, and all participants in the reflection note sample provided written consent, as did most of the participants in the interview sample. However, the participants who were interviewed over the telephone had to return the consent form by regular mail, which not everybody did. Nevertheless, all participants were duly informed and provided oral consent at the beginning of the interview.

Findings

The study's research question guided us towards exploring possible associations between participants' ways of relating to Andy (the program) and change—change in this case meaning quitting smoking and staying smoke-free. However, as data collection and analysis proceeded, we became fascinated with how quitting smoking with Andy involved many complex internal change processes. One of these internal change processes seemed to play a crucial role in either (if restricted) closing up the participants' ability to focus on changing, making them become distracted by other people's wishes, needs, and desires; or (if facilitated) opening up their ability to work constructively and creatively on changing, on their own terms and in their own ways. We called this something which was either closed in or opened up *change-space*, and the focus of our analysis and ensuing model became defining what closed change-space in and what opened change-space up. Therefore, in the following, we will begin by describing how change-space for some participants was restricted through what we call *social forcing*. Then we will describe how participants got change-space through how they related to Andy. A grounded theory model is presented at the end of this section.

All expressions in quotation marks are data excerpts. The excerpts are de-identified; however, participants are numbered to facilitate the reader's judgement of how well the analysis represents the data, and their gender is indicated. All excerpts are from participants who were interviewed, except for participant 7, who participated through reflection notes.

Change-Space Is Restricted by Social Forcing

Some participants seemed restricted in their efforts to quit smoking by what we call *social forcing*; that is, being unable to engage in constructive change-work because one is preoccupied with what other people might think, want, or feel. Social forcing often came from family members or partners, who worried about the participant's health and therefore wanted him/her to quit. Another source of social forcing was friends and colleagues. The various forms of social forcing included pressure, expectations, judgment, and uninvited interference. This caused participants to focus on the other, or their relationship to the other, instead of focusing on changing on their own terms and according to their own needs. Thus, a necessary premise

for later change work was to become sufficiently free from social forcing. We were surprised by the many and subtle ways in which participants could feel socially forced. The subtlety and sometimes pervasiveness of social forcing was important for understanding how participants got change-space. We will therefore provide the reader with an overview of different forms of social forcing.

The most obvious form of social forcing was intentional: Others pushed or harassed the participant into quitting, upon which participants would sometimes fling themselves into "unsustainable" quit attempts—that is, quit attempts that they on some level knew would probably turn out unsuccessful, leading to the inevitable letdown of "another failure." Failure, in turn, would sometimes invoke more social forcing, with partners and family members expressing disappointment or anger in a form of emotional sanctioning. Other times, participants were judged for failing, or ridiculed if they wanted to try quitting again after previous failures, as expressed by one participant: "If I hear that others think that this is something to laugh about, that I want to quit again, then I may find myself going back to smoking. (…) Maybe I'm just not taking this seriously enough, then" (participant 1, female).

These forms of social forcing seemed intentional; however, social forcing could also be seemingly well-intended and expressed through others' positive expectations. Some participants experienced others' hopes of them succeeding as a form of social forcing. In this shift of focus from self to other, these participants would become overly concerned with the possibility of letting the other down—instead of thinking about what they themselves wanted or what would be right for them. Feeling responsible for the other's feelings in this way could even lead to self-handicapping; this paradox was expressed as following by one participant:

> I think you run around afraid of disappointing everyone else and disregarding your own needs. You run around thinking… If *I* don't quit smoking, *they* will be disappointed. It's easier, then, to just go ahead and smoke, because then you won't disappoint them [*dry laugh*]. (Participant 2, male)

Social forcing could also assume the shape of others interfering in the participants' change attempts without being invited to do so, through asking seemingly friendly questions or offering unsolicited advice. To some participants, this uninvited interference was experienced as a form of intrusion; as "planting seeds of doubt" or "questioning" their ability to stay smoke-free. Participants found themselves being reminded of quitting as a "problem;" of having to reflect when they did not want to reflect. One participant explained it like this:

> A friend asked me, "Are you motivated?" And I was very provoked by that question, because I had been up until then. But when she asked me that question, she doubted my motivation. And that sort of annoyed me. I think she should have taken it for granted that I was motivated! So, she contributed to creating some thoughts in me, or a doubt. So sometimes when you involve other people you can become affected, and you may be affected in the wrong direction. (Participant 3, female)

Importantly, social forcing, whether ill-intended or well-intended, was *perceived* as emanating from the other; however, it most of all resided in the participants' own interpretations and beliefs. As such, social forcing could be experienced in the absence of explicit force, or even when the other's actions seemed supportive. Consequently, some participants considered feeling forced by an inevitable element of discussing quitting with others, discouraging them from seeking others' support. This was exemplified in many participants' reluctance to the idea of getting help to quit smoking with a psychologist, which one participant said would feel like

being "cornered." The interpretive essence of social forcing is pointedly illustrated in another participant's story. This participant had a long-standing desire to quit smoking but found quitting extremely difficult. Accepting this, she had told her partner that she expected to fail many times before finally succeeding. He supported her through these processes, and she spoke affectionately about him. It therefore seemed surprising to the interviewer when the participant told her that when she experienced a lapse, she kept it from her partner. When Holter asked her why, she talked about their history as a couple; how both had been athletic and lead healthy lives. While her partner had continued this lifestyle, she had started smoking more and more, and she felt ashamed when she imagined how she must have changed in his view since then: "That's not the image I want him to have in his head of me." Therefore, despite of how important quitting was to her, it was more important that her partner maintained a positive view of her (i.e., that she was getting on well with quitting) than to get his help to become smoke-free again. This reluctance to turn to her partner for help was embedded in her conviction of "knowing" what he was "really" thinking, which is illustrated in the following excerpt:

> So, we're at a café, and I'm smoking, and I'm noticing the cigarette smoke reaching him, so he moves a little, I know that he's not that keen, but he never complains, he says, "No, it's fine". But deep inside I know that he wants me to be healthy! That he wants me to be happy, and he knows I'm not happy smoking. Because I do complain about it. (Participant 4, female)

This conviction of "knowing" what the other "really" thinks was a defining feature of social forcing and was decisive in the process of turning positive expectations, uninvited interference, and supportive gestures into an experience of being forced. Another defining feature was that social forcing caused a shift in attentional focus: participants experienced social forcing when *caring* about what (they believed) the other was thinking about their quitting processes and focusing on this instead of on the quitting process itself. A final defining element of social forcing was that the attentional shift caused participants to feel immobilized or restricted in what was acceptable to think, feel, or do regarding quitting—we say that social forcing limited their *change-space*. This process is visually illustrated in Figure 3.
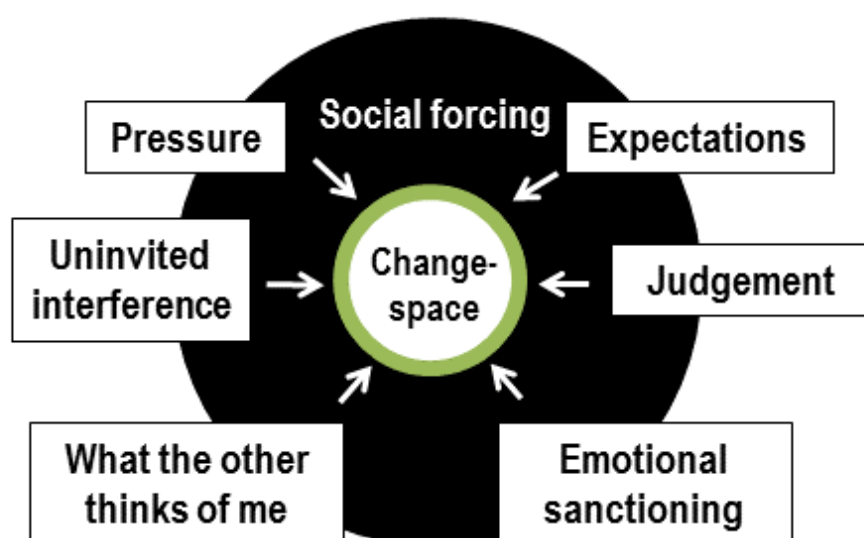

Figure 2. Various forms of social forcing restrict change-space.

Getting Change-Space through Making Come-Alive and Keeping Un-Alive

Participants who experienced a lot of social forcing and therefore needed change-space got change-space through Andy (the program). Participants partly found change-space in Andy through experiencing that the program was not trying to force them into quitting, but instead focused on what *they* thought, felt, and wanted to do. Participants who reported lapsing in their quit attempt experienced that Andy did not judge or sanction them. Instead, they expressed that Andy made quitting smoking into "my plan," "my project." As one participant put it, "We tend to separate between 'succeeded' and 'failed'. Here it's more 'go on'" (participant 5, female).

In addition to this non-judgmental tone, participants got change-space through how they related to Andy; that is, through making come-alive and keeping un-alive. Making come-alive most often led participants to experience Andy as a supportive social presence, because most participants evaluated the program interaction positively. This supportive social presence was helpful in the participants' quit attempts: they felt encouraged in their intents and attempts, and hardships and setbacks seemed more tolerable and transitory. Andy was described as "someone" (not something) who "understood," "supported," and "cared;" someone who "believed in" them, "looked after" them and could "be there" for them. Sometimes, participants referred to Andy as a "conversational partner," a "psychologist," or a "friend." Because making come-alive made Andy momentarily into another human being in the minds of the participants, Andy's support engendered a sense of being accepted. Feeling understood by another person meant that it was safe to acknowledge one's true thoughts and feelings about quitting, even though these feelings might be mixed. Moreover, feeling looked after and supported by this person seemed to create a feeling of not being alone, of having someone sharing or witnessing their journey. Thus, the supportive social presence constructed by making come-alive gave participants confidence and freedom to work constructively with change-processes; what we previously defined as getting change-space. The significance of feeling truly understood by someone was described as following by one participant, who talked about what using Andy had been like:

> It was a little bit like having a—well, an *understanding friend* who understood what I was going through. Of course, you may have friends, or boyfriends, who of course support you if you have to quit, but who don't really understand how hard it can be. (…) I got a feeling there was a *person* there (small laugh) who understood that this was tough as hell. (Participant 6, female)

While making come-alive encouraged participants, keeping un-alive removed any sense of social forcing. As accounted for previously, keeping un-alive entailed thinking about Andy as a computer program incapable of thinking, feeling, or acting independently. This eliminated social forcing as an interactional possibility: by reminding themselves that Andy was in fact a computer program, participants knew that it had no real social power. Keeping un-alive therefore made it obvious that no matter what they did, Andy *could not* be disappointed, *would not* worry, *would not* judge, wished nothing, felt nothing, thought nothing, and would never sanction. By keeping un-alive, participants knew that there was no relationship that could be affected by their quitting success or failure. Furthermore, because keeping un-alive entailed acknowledging that Andy could not think or feel, using the program involved no "other" through whose eyes they could disappointingly see themselves: There was no point in imagining what Andy was "really thinking" about their progress, because Andy did not think. This absence of social forcing in the participants' way of relating to Andy was often contrasted to other relationships, which never were only about quitting smoking, but also about the other, the relationship, and the participant's self-image. Through keeping un-alive when working with

Andy, these other distracting elements of the interaction could be disregarded, thus returning the participants' focus to their own thoughts and feelings about quitting; that is, keeping un-alive gave participants change-space. The usefulness of having an arena free from social restrictions was expressed by one participant this way:

> Here I can relate to a "person". Answer what I want to answer, receive encouragements and okay questions that I answer as much as I feel like. I see my quitting process as something personal and I don't feel like talking too much with others or discussing it with them. The program therefore suits me fine. (Participant 7, female)

As the previous data excerpt illustrates, alternating between making come-alive ("person") and keeping un-alive ("the program") seemed particularly helpful in constructive change-work: By interchangeably making come-alive and keeping un-alive, Andy became a special kind of semi-social presence that was both a social actor and not a social actor, creating an arena in which participants were both free from social forcing and empowered by a social presence. The social presence of Andy was free from a complicated human relationship or actual emotions, giving Andy a unique position in their change-attempts. This was explained by one participant in the following way: "[Andy is like] a secret friend… or someone who…can give you advice without pushing you, a friend who doesn't love you or hate you, someone who doesn't know you, who can give you good advice." (Participant 8, female). A similar sentiment was expressed by another participant, who explained why she had decided not to tell her family about trying to quit smoking this time: "Because I don't want to disappoint them that much. And I don't have to [worry about that] with Andy. So, it's nice—to have a neutral person who doesn't care, but who cares at the same time." (Participant 9, female).

In sum, making come-alive and keeping un-alive were instrumental in turning Andy into a venue for getting change-space. In other words, the ways in which participants related to Andy made it easier to use the program for further change-work, which they then could take on more constructively, freely, creatively, and confidently. These processes are illustrated in a theoretical model in Figure 4.
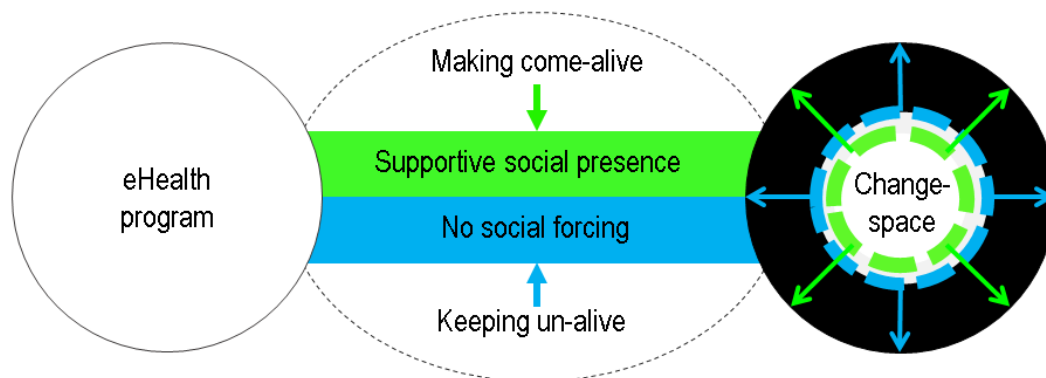

Figure 3. A model of how automated eHealth therapy can facilitate change-space through relational processes

Discussion

The purpose of this study was to explore the interplay between relating and change in the use of an automated eHealth program. We asked the following research question: *Do ways of relating to an eHealth program influence change, and if so—how?* In answering this

question, we conducted a grounded theory study (Charmaz, 2014) with users of "Endre" (in English: "Andy"), an automated eHealth program for quitting smoking. Through a separate study described in another article we conceptualized "ways of relating" as "making come-alive" (i.e., thinking about the program as capable of thinking, feeling, and acting) and "keeping un-alive" (i.e., thinking about the program as an inanimate object), the combination of which can be called a "semi-social relationship" (Figure 1; adapted from Holter et al., 2019). Regarding change, we focused our analysis on what we call *getting change-space*; which we propose is a prerequisite for constructive change-work. Getting change-space involved being free from *social forcing* and supported to work on changing on one's own terms. We found that participants got change-space through a semi-social relationship to Andy: Through keeping un-alive the participants were reminded that Andy could not judge or pressure them, thus eliminating the restrictions of social forcing; while through making come-alive they experienced Andy as a social presence that supported and encouraged them in changing on their own terms (Figure 4).

Comparisons to Prior Research

According to the presented change-space model, change is facilitated if the person does not experience social forcing when using the program. This confirms prior research in eHealth which points to the absence of judgement or ulterior motives as important program features. For example, Brandt et al. (2013) describe the program as "a universe that prepared them [the participants] for the task at hand. The atmosphere was described as inclusive and non-judgmental" (p. 238), while Clarke et al. (2016) found that many participants found it easier to communicate with the program than with their friends and family. We extend on these previous observations of a non-judgmental tone's positive effects by providing a theoretical explanation: that being free from judgement means being free from social forcing, which gives program users change-space. Furthermore, we suggest that the positive effects of non-judgement can be additionally amplified by keeping un-alive.

We also found that by experiencing the program as a supportive social presence, the particular change-process of getting change-space was facilitated. Prior work has documented that people can relate to programs as if they were persons and with positive social emotions (Bickmore, Caruso, et al., 2005; Bickmore, Gruber, et al., 2005; Brandt et al., 2013; Clarke et al., 2016; Kaplan et al., 2003), but this has not been systematically analyzed as potentially change-supporting processes. Thus, we extend on this research by showing that the experienced supportive social presence facilitated a change-process, which theoretically can be explained as making come-alive giving program users change-space.

As reviewed earlier in this article, little prior work has been done on how relational processes in automated therapy influence change. While the relevant qualitative work has not focused on what relating *does*, quantitative studies have either not been able to document any association between alliance and outcome (Bickmore, Gruber, et al., 2005; Clarke et al., 2016; Kiluk et al., 2014; Ormrod et al., 2010) or used a measure that disregards a potential person-to-program emotional bond (Meyer et al., 2015). Hence, as far as we know, the current study is the first to systematically document an association between relating and a change process in automated eHealth programs, and to provide a theoretical model to explain these processes.

The Change-Space Model Supports a Person-to-Program Alliance

The documented association between relating and a change-process—that making come-alive and keeping un-alive gave participants change-space—supports the working alliance as a useful concept in automated therapy. We argue elsewhere that when participants

made come-alive, their experience of being supported, understood, and cared for resembles the emotional bond of a working alliance, thus making it meaningful to call it a person-to-program emotional bond (Holter et al., 2019). In the current study, we go one step further and show that this emotional bond may be useful in supporting change: feeling supported and encouraged by Andy (the program) gave people change-space, which we argue enables further change-work. Through its resemblance to an emotional bond and its support of change-relevant processes, it seems reasonable to suggest making come-alive as part of a person-to-program alliance.

However, we also found that participants got change-space through keeping un-alive. This is not as readily explained by the traditional alliance-concept; a more useful construct for this purpose may be Cooley's (2017/1902) concept of "the looking glass self." According to Cooley, social life is an integral part of the self: we see ourselves as we believe the other sees us and thus use the other as a psychological "looking glass" (i.e., mirror). He argued that in social interaction, a person usually has "a somewhat definite imagination of how one's self (…) appears in a particular mind;" a self-judgement which is "attributed to that other mind" and which subsequently generates a "self-feeling, such as pride or mortification." This is not a process that can be easily escaped: "We always imagine, and imagining share, the judgments of the other mind" (p. 261). The looking glass self seems suitable for explaining the experience of social forcing: because interacting with another human being always involves imagining the other's judgements, all interaction can feel like social forcing. The decisive element in this forcing is not the other's actions; it is one's own imagination of how one is judged by the other. This resonates well with the many manifestations we found of social forcing, which included participants feeling forced by others' seemingly innocent questions ("are you motivated?") and despite their expressed support (because of assumptions about "the image he has in his head of me"). This felt judgement can be seen as an essential *self*-judgement, attributed to the other, and subsequently shared, creating a self-feeling—a negative feeling, because the imagined judgement is negative. Importantly, because the social forcing of the other's judgement is imagined, it is not easily escaped, which can explain why some participants "did not feel like discussing" their quit attempts with anyone, and why many were reluctant to the idea of consulting a therapist for quitting smoking. Involving other people means being confronted with one's own quit-related self-judgement and the risk of social forcing.

While there may be no easy escape from the other's imagined judgement in human relationships, there is an escape in the semi-social relationship, provided by keeping un-alive (Holter et al., 2019). By keeping un-alive participants reminded themselves that with Andy (the program), there was no other person to judge them, and thus no one to attribute any negative self-judgements to; no other "mind" present except their own. Thus, whether consciously or unconsciously, keeping un-alive could be used for self-protection: if participants thought Andy might judge their progress negatively, they could remind themselves that Andy could not think or feel, removing the threat of negative self-feelings created by the other's imagined judgement. Removing the possibility of negative self-judgement also removed the potential for social forcing, thus giving participants change-space. In short, the positive influence of keeping un-alive on participants' change-space can be explained through its temporary escape from the looking glass self.

Thus, in the semi-social relationship to Andy, both making come-alive and keeping un-alive gave participants change-space, but through different mechanisms: by relating to Andy as if it were a person (i.e., making come-alive) participants felt encouraged and supported in quitting as in an emotional bond, while relating to Andy as a computer program (i.e., keeping un-alive) kept Andy at a distance and temporarily freed them from the looking glass self. Because both relational processes were instrumental in facilitating change, we suggest that both making come-alive *and* keeping un-alive should be considered parts of the person-to-program alliance.

That constructive change-work can be facilitated by keeping the "conversational partner" at a distance is somewhat surprisingly mirrored in psychotherapy research. Two qualitative psychotherapy studies are of particular interest: The first study was by Carey et al. (2007), who interviewed clients (N = 27) to understand psychological change from the "inside" and analyzed data with the framework approach; the other study was by Lilliengren and Werbart (2005), who explored clients' (N = 22) perspectives of curative and hindering factors in psychotherapy and analyzed the data using grounded theory. Amongst the facilitative factors identified in these studies was the therapist being experienced as someone supportive, sharing the clients' journey (Carey et al., 2007), and cultivating an atmosphere of acceptance and respectfulness (Lilliengren & Werbart, 2005). However, participants in these studies also talked about the importance of having a place where they did not feel judged and contrasted this to difficulties in sharing their problems in close relationships (Carey et al., 2007). As such, participants appreciated the therapist as an "outside person" not part of their everyday lives (Lilliengren & Werbart, 2005) with "no personal connections with the participant, no previous knowledge or preconceptions about them" (Carey et al., 2007, p. 182). The wholeness of therapy was described as having a "breathing space" or a "neutral zone" (Lilliengren & Werbart, 2005, p. 330); what the researchers call "having a special place and a special kind of relationship." This element of clinically useful estrangement in therapy resembles the suggested role of keeping un-alive in the semi-social relationship; in both cases, the "helper" (i.e., therapist/program) is kept at an emotional distance in a way that presumably protects the looking glass self (Cooley, 2017/1902), thus freeing the client/program user from the threat of social forcing and making it possible to focus his/her energy and attention on constructive change-work. Through including an element of useful distance, the semi-social relationship may therefore resemble more the client-therapist relationship than it resembles the relationship to for example a friend.

Validity and Transferability

We have sought to increase this study's validity through committing to grounded theory's iterative analytic process and method of constant comparison (Charmaz, 2014). Furthermore, the revised interview guide included the use of epistemic interviewing, in which the interviewer continuously tests and validates his/her analysis with the participant (Brinkmann, 2007). Additionally, we have engaged in reflexive memo writing throughout the study (Finlay, 2002, 2012) in an effort to constrict our presumptions from shaping the analysis. Re-reading our memos upon writing up confirmed to us that on numerous occasions, we were confronted with data that challenged our preunderstandings, and that these situations caused us to question and change our initial understandings of the processes under study. Finally, reflection notes were added as an additional data source for the purpose of methodological triangulation (Maxwell, 2013).

Because the suggested change-space model is based on only one study, its transferability to other programs and contexts should be considered. Of course, this is ultimately an empirical question; however, it is possible to theorize expected transferability by thinking of the study as a "transferring context" and the model as a potential "working hypothesis" for other "receiving contexts" (Guba, 1981). The transferring context of the current study includes a specific eHealth program (Andy) and a specific treatment goal (quitting smoking) within a specific cultural context (Norway). Regarding the relational processes making come-alive and keeping un-alive, it is likely that these are transferrable to other contexts: Findings in other eHealth studies are overall in accordance with making come-alive and keeping un-alive (Bickmore, Caruso, et al., 2005; Bickmore, Gruber, et al., 2005; Brandt et al., 2013; Clarke et al., 2016; Kaplan et al., 2003). These studies were conducted in different

countries on different types of behavior change with dissimilar eHealth interventions, including interventions based on Interactive Voice Recognition (Kaplan et al., 2003), interventions using embodied relational agents that communicate both verbally and non-verbally (Bickmore, Caruso, et al., 2005; Bickmore, Gruber, et al., 2005) and interventions primarily based on a web-page that can be navigated by the program user and which includes no relational agent (Brandt et al., 2013).

Regarding the transferability of the need for change-space and the restrictions placed on change-space by social forcing, it is likely that this will vary somewhat depending on the target behavior and cultural setting. In Norway, the prevalence of smoking has decreased dramatically over the course of a few decades (Gartner et al., 2017) and many regard smoking as a stigmatized behavior. This suggests a substantial intensity and pervasiveness of social forcing for quitting smoking in Norway, which may have influenced the significance of getting change-space for the participants in the current study. We therefore presume that the change-space model in its current form will be less useful for explaining eHealth-facilitated change that is not stigmatized. Nevertheless, from the present review, it seems reasonable to suggest that the change-space model is a promising working hypothesis (Guba, 1981) for explaining how eHealth programs enable constructive change-work, at least if the behavior or condition is stigmatized.

Study Strengths and Limitations

One study limitation is arguably the relatively few participants; although the total study sample consists of 32 participants, only 16 were interviewed and it is this data that has had the greatest influence on the resulting model. However, we stopped interviewing because we judged that the model had reached theoretical saturation (Charmaz, 2014), and as such we considered the data to be sufficient to support the presented model. Moreover, the quality of a qualitative study lies not necessarily with the number of participants, but rather, in the quality of the data and of the analysis (Brinkmann & Kvale, 2015; O'Reilly & Parker, 2013; Polkinghorne, 2005): these are aspects we believe lie within this study's strengths.

One of the strengths of this study is the improved strategy for data collection: that we underwent a process of methodological refinement for improving the interview guide and that reflection notes were added as a method for methodological triangulation (Maxwell, 2013), which validated our analysis with a separate sample and data collection method. Another study strength is the rigorous analysis, and a third is our efforts to maintain transparency, reflectivity, and trustworthiness in reporting.

On a more conceptual level, there are limitations to what this study can tell us about the person-to-program alliance as well as eHealth-facilitated change. One such limitation is that this article only addresses one change-process (i.e., getting change-space), which we propose to be the beginning of constructive change-work. Changing necessarily involves other processes as well, and the proposed model does not account for the role of the person-to-program alliance in these change-processes. Furthermore, we were not able to test the importance of getting change-space for subsequent change-work and overt behavior change (in this case, quitting smoking and staying smoke-free). Thus, although it seems compelling that succeeding in behavior change is more likely if one feels free from social forcing and has change-space to work constructively and freely on changing, we do not yet have empirical data to support this proposition, as we do not have data to link change-space to smoking status. The lack of such a linkage in our analysis has three main explanations: The first is that we know from clinical experience as well as literature that quitting smoking is a crooked path which for many people involves many lapses and relapses before lasting behavior change is acquired (Piasecki, 2006). This has implications relevant to the expected validity of data on smoking

status at the point of data collection: Participants who were smoke-free at the point of data collection might unknowingly be on the edge of a (re)lapse, making it inaccurate if we had labeled them "successful." Moreover, participants who were *not* smoke-free at the point of data collection might simply be working on quitting through a different approach, working through internal processes that would lead them to their next, possibly final, quit attempt, making it inaccurate to label them as "unsuccessful." In fact, our focus on internal change processes was in part guided precisely by Marianne T. S. Holter's curiosity from working clinically with quitting smoking support over why some people seem to struggle so much in finding their feet in quitting, seemingly motivated but still moving from one failed attempt to another, while others seem to find some internal "switch" that makes their decision and implemented changes seemingly unwavering. The second reason for not including a linkage with smoking status was our view of the causal processes involved in quitting smoking as open systems (Houston, 2001): even if we are right in our assumption that getting change-space is important for successful behavior change, we also expect a large range of other abilities, processes, and circumstances to be important in deciding whether a person succeeds in quitting smoking or not. Thus, to get reliable data on the association between change-space and overt behavior change, one would need a larger number of participants. In other words, if we were to test our hypothesis of the importance of change-space for overt change with valid data, it would have required a different and more longitudinal study design and a much larger number of participants. Finally, and perhaps most importantly, we considered that before the association between getting change-space and overt behavior change could be examined, it was necessary to define change-space; thus, this was the task we undertook in the present article. However, before the importance of change-space can be ascertained, its assumed connection with overt and lasting behavior change should be verified empirically.

Another conceptual limitation is that this study presumably only explains one element of the person-to-program alliance: The relational processes that we have identified resemble a sort of emotional bond (Bordin, 1979) between person and program, and therefore the change-space model does not explain the potential role of agreement on goals and tasks in automated therapy, nor other potential aspects of the person-to-program alliance. Nevertheless, the current study does provide evidence supporting that such a bond exists and is useful, and its documentation of how relational processes influence change and the explanation of these processes through the proposed change-space model amount to a significant contribution to our current understanding of the person-to-program alliance.

By providing evidence for the person-to-program alliance as a viable construct, this study warrants further research. For example, the usefulness and transferability of the presently suggested change-space model should preferably be investigated empirically, with other interventions and contextual factors. There is also a need to investigate whether relational processes in automated therapy influence other change-processes as well, and their significance for overt and lasting behavior change. We also suggest that further research should target both making come-alive and keeping un-alive as parts of the person-to-program alliance and as potentially change-facilitating processes. It is for example possible that keeping un-alive may facilitate the program user's honesty or trust—elements that are also considered part of an emotional bond of an alliance (Bordin, 1979; Horvath & Greenberg, 1989).

In sum, this article proposes a grounded theory model (Figure 4) of how ways of relating to an automated eHealth program (Holter et al., 2019) facilitates constructive change-work. This study thereby supports the person-to-program alliance as a viable and useful construct for understanding eHealth-supported change and suggests that it includes both making come-alive and keeping un-alive. The viability of a person-to-program alliance is further supported by the parallels to change-supporting elements in the client-therapist relationship (Carey et al., 2007; Lilliengren & Werbart, 2005), as both types of alliance seem

to include an experienced supportive social presence as well as an element of clinically useful estrangement. By providing evidence for an association between relating and change, this study also provides support for the person-to-program alliance as an eHealth working mechanism. A practical implication of this is that eHealth programs may benefit from being designed to facilitate both making come-alive *and* keeping un-alive; an implication which is not apparent in adopting the alliance-concept from psychotherapy. As such, the other main contribution of this article is that the change-space model is an eHealth-specific theory, which takes into account the unique features of this medium in its explanation of change. This and similar efforts to advance our theoretical understanding of eHealth-facilitated change will in turn make it possible to build increasingly effective programs, and ultimately tap into the potential of these technological interventions for bettering people's health and well-being.

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