Virtual Afterlife: The Use of Deepfake Technology in Prolonged Grief Treatment

An Examination of Bereaved People's and Clinicians' Opinions

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Abstract

Background

Approximately one in ten adults experiencing bereavement will develop clinically significant levels of prolonged grief disorder (PGD) symptoms. Deepfake technology may address the current treatment gap in bereavement care. However, knowledge about the opinions of bereaved people and clinicians regarding its use in grief treatment is lacking.

Objective

This cross-sectional study explored how background characteristics, loss-related characteristics, and technology adoption factors relate to the intention to use deepfake technology in grief treatment among bereaved people and clinicians.

Method

A web-based survey was administered to 136 Dutch adults who lost a loved one at least 12 months prior to the study and to 91 Dutch mental healthcare clinicians. Multiple regression analyses identified correlates of the intentions to use deepfake technology in grief treatment.

Results

One in four bereaved people and approximately one in two clinicians intended to use deepfake technology in grief treatment. For bereaved people, the intention to use deepfake technology was significantly related to acceptability, appropriateness, social influence, and performance expectancy, while for clinicians, it was related to acceptability and effort expectancy.

Conclusions

Increasing performance expectancy and acceptability of deepfake technology may aid its successful adoption in grief treatment. While future research should evaluate its efficacy, this study's findings mark a crucial step towards implementing deepfake technology in grief treatment.

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Losing a loved one can be seen as one of the most challenging stressors in life (Szuhany et al., 2021). Approximately one in ten individuals experiencing bereavement in adulthood will suffer from clinically significant levels of prolonged grief disorder (PGD) symptoms (Lundorff et al., 2017). Specifically, when, 12 months after the death of a close other an individual is left with a continuous preoccupation with and/or intense longing for the deceased person they might be diagnosed with PGD according to the text-revised fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) (American Psychiatric Association, 2022; Lundorff et al., 2017). Additional PGD symptoms include difficulties accepting the death, feelings of loss of a part of oneself, emotional numbness, intense loneliness, anger about the loss, guilt, and/or difficulties with life reintegration (American Psychiatric Association, 2022).

Interventions containing cognitive-behavioural aspects show to be effective in achieving an improvement in PGD patients' condition (Komischke-Konnerup et al., 2024; Szuhany et al., 2021). Cognitive Behavioural Therapy (CBT), especially incorporating exposure-based elements (i.e., revisiting distressing memories), is crucial as a first-line treatment for achieving optimal PGD symptom reduction (Bryant et al., 2014; Lenferink et al., 2023; Szuhany et al., 2021). However, despite exposure's role as the most effective ingredient, there remains a gap between research and practice, with exposure often underutilised in clinical settings. More specifically, exposure is regularly avoided by therapists because they perceive it as a daunting treatment form (Sars & van Minnen, 2012). Similarly, bereaved people frequently miss out on necessary treatment, as they struggle with the idea that no one can provide suitable support (Lenferink et al., 2021). Hence, this asks for a complementary treatment modality that will meet the needs of both bereaved people and therapists, such as deepfake technology.

Deepfake ("deep-learning" and "fake") is defined as "manipulated or synthetic audio or visual media that seem authentic, and which feature people that appear to say or do something they have never said or done, produced using artificial intelligence techniques, including machine learning and deep learning" (European Parliament Research Services, 2021, p. I). The technology relies on neural networks that examine data sample sets in order to be trained in taking over a person's facial expressions, mannerisms, and voice (Westerlund, 2019). By means of facial mapping technology a person's face in an image or video clip can be transformed into the face of someone else (Westerlund, 2019). Additionally, people's expressions can be controlled and performed via the reconstructing algorithms (Yu et al., 2021).

In 2020 a short documentary was released in the Netherlands, reaching the news due to its both moving and questionable nature (Deepfake Therapy: Praten Met Overleden Dierbaren, 2020; Munnichs, 2020; Verhagen, 2022). In Roshan Nejal's documentary, people who have lost their loved ones are brought into hyper-realistic contact with the loved one who passed away, via the digitally manipulated deepfake videos (Munnichs, 2020; Westerlund, 2019).

As shown in the documentary, the technology facilitated simulated interactions between bereaved people and their deceased partners or children by asking questions or recalling memories together (Munnichs, 2020). The rationale for this is that providing grieving individuals the option to connect with the deceased, can induce feelings of rest and foster the acceptance of the impossibility of staying in contact (Munnichs, 2020). Similarly to the fact that delivery of exposure to patients via Virtual Reality seems promising in treating elevated grief levels (Botella et al., 2008; Quero et al., 2018), deepfake might serve as a tool to support exposure in CBT. Moreover, symptom reduction and/or speeding up the grief process may result from the introduction of deepfake to PGD patients (Pizzoli et al., 2021).

This can be advantageous in various situations. For instance, following the Covid-19 pandemic, where restrictions led to the absence of traditional grief rituals, thereby hampering usual grief experiences and risking enduring grief symptoms (Eisma et al., 2020; Pizzoli et al., 2021; Wallace et al., 2020).

Deepfake has demonstrated its relevance through, among others, its application in victim-offender mediation. Van Minnen et al. (2022) obtained positive evaluations from two women suffering from PTSD and moral injury, after they were introduced to a deepfake version of their perpetrators. Post-intervention, they reported reduced negative emotions, self-blame, and PTSD symptoms, while experiencing increased positive emotions, dominance, and self-forgiveness. Furthermore, deepfake contributed to counteracting the exacerbation of the conditions of patients with dementia by stimulating their memory (i.e., exposure to familiar events or faces) (Hancock & Bailenson, 2021; Westerlund, 2019).

Though the use of deepfake technology in treating PGD may offer several advantages, there is currently a lack of understanding regarding its risks, ethical concerns, clinical guidelines, and public opinions regarding its use. Hence, to grasp the potential implications of incorporating deepfake technology into therapeutic practice, it becomes imperative to delve into the factors influencing its implementation. Magotra et al. (2016) found that personal disposition towards technology adoption is influenced by factors such as income, education, and age. Hence, it is important to examine background characteristics in relation to the intention to use deepfake technology in grief treatment. Similarly, both background and loss-related characteristics (e.g., education, previous support from a psychologist, pathological grief levels) were shown to be correlates of behavioural intentions towards online grief treatment (Lenferink et al., 2021). Understanding these intentions is crucial, as the Theory of Planned Behaviour (TPB) posits that intentions are the most proximal predictors of actual behaviour. Therefore, to gauge whether people would use deepfake technology in practice, it

is essential to first assess their intentions, which encompass the motivational components: attitude, subjective norm, and perceived behavioural control (Ajzen, 1991).

Specifically, attitude denotes the extent to which a person views a behaviour as positive or negative (Azjen, 1991). Etemad-Sajadi et al. (2022) focussed on the effect of ethical issues raised by human-robot interactions on the intention to utilise the robot. They emphasised aspects such as attitudes towards privacy and data protection, trust and safety, as well as responsibility. Additionally, concerns regarding data security, indicating attitudes towards personal information management, as well as a lack of knowledge in implementing technology in clinical practice, can act as barriers to accept Internet-interventions (Ebert et al., 2015). Indeed, Proctor et al. (2010) advocate for the importance of considering acceptability as a critical factor in determining successful uptake of new practices and treatments. This uptake is depending on the extent to which the innovation is viewed as relevant and fitting in tackling the issue at hand, along with a clinician's view on the readiness of the treatment domain for new technology adoption (Feijt et al., 2021; Proctor et al., 2010). Lastly, as long-term consequences should be considered, such as the risk of triggering dependence or prompting addiction, evaluations can also depend on the perceived negative psychological consequences (Pizzoli et al., 2021).

Another determinant in the TPB is the subjective norm, which involves social expectations about performing a particular action. Considering social influence is crucial for predicting the adoption of deepfake technology, as it highlights the opinions and support from the social environment of bereaved people and clinicians (e.g., colleagues, close others, general practitioner) (Alzahrani, 2021). Moreover, the Unified Theory of Acceptance and Use of Technology (UTAUT) claims that within the framework of clinicians as potential adopters, the presence of facilitating conditions, meaning the organisation's infrastructure fostering its use in practice, plausibly modifies the adoption willingness (Alzahrani, 2021; Venkatesh et

al., 2003).

Finally, perceived behavioural control, i.e., one's perspective on the extent to which the execution of an action is effortless, influences the intention (Ajzen, 1991). The UTAUT model also accentuates the role of effort expectancy and performance expectancy in predicting potential adopters' willingness to use new technologies (Alzahrani, 2021). These factors, relating to improved work performance and the ease of use, can thus shape bereaved people and clinicians their outlook on their abilities to adequately manage and use deepfake in a treatment setting (Alzahrani, 2021; Ebert et al., 2015). Ultimately, when clinicians perceive themselves as possessing the essential competences to adopt deepfake they might consider themselves in control and ready to employ it in practice (Feijt et al., 2021). This idea is strengthened by the Technology Acceptance Model (TAM) which argues that the perceived ease of use (i.e., effort expectancy) and perceived usefulness (i.e., performance expectancy) are crucial factors constructing one's opinion towards using an innovative technology (Davis, 1989). Furthermore, the degree to which it can be adequately executed within a grief treatment setting (i.e., feasibility) can be an indicator of behavioural achievement (Ajzen, 1991; Proctor et al., 2010). Taken together, these three antecedents, i.e., attitude, subjective norm, and perceived behavioural control, then can establish whether bereaved people and clinicians would use deepfake when they would have the technology to their access (see Figure 1) (Etemad-Sajadi et al., 2022).

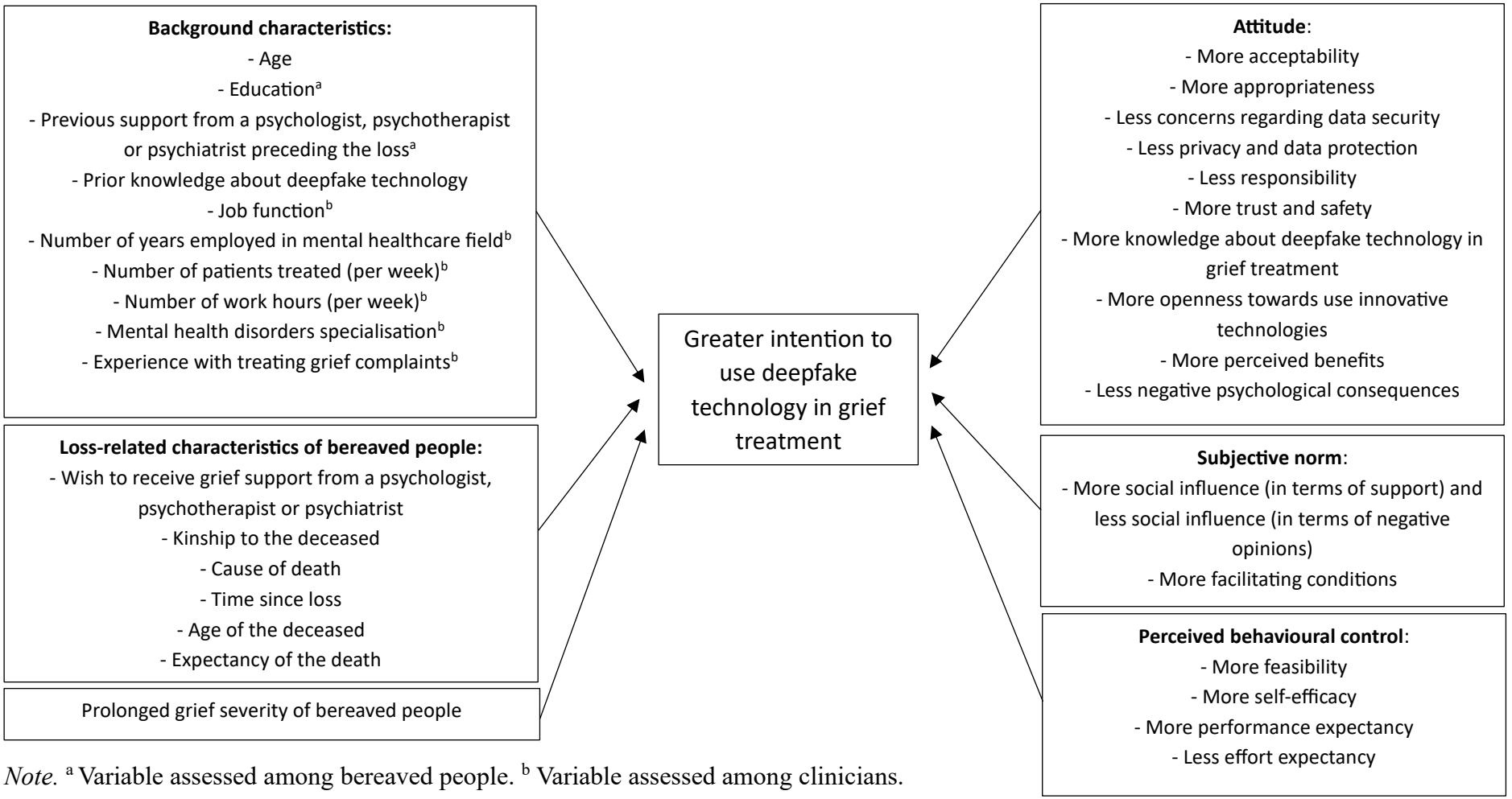
Study AIM

Deepfake might serve as a tool to facilitate and support exposure in treatment and to meet the needs of both patients and clinicians, and consequently overcoming the treatment gap in bereavement care. To date, research examining facilitators and barriers for the intention to use deepfake technology in PGD treatment is lacking. Therefore, this exploratory survey-study serves as a first step into the examination of the extent to which attitudes, subjective

norm, and perceived behavioural control are in line with the intention to use deepfake technology in grief treatment on top of known background and loss-related characteristics. Including both the perspectives of bereaved people and clinicians can provide a coherent picture of the current opinions towards the intention to use deepfake technology in grief treatment and optimally guide future decisions concerning potential implementation of therapeutic deepfake. Therefore, the following research question has been defined: *To what extent do background characteristics, loss-related characteristics, and technology adoption factors relate to bereaved people and clinicians their intention to use deepfake technology in grief treatment?*

Figure 1

Conceptual Framework for Assessing Deepfake Technology Adoption in Grief Treatment for Bereaved People and Clinicians



Note. [a] Variable assessed among bereaved people. [b] Variable assessed among clinicians.

Method

Participants

The opinions of both bereaved people and clinicians were included. The Ethics Committee of the University of Twente approved the research project (request number: 240204). Those with an age of 18 or higher and sufficiently speaking Dutch were eligible for participation, as the survey was provided in Dutch. Concerning the bereaved people, the passing of their partner, family member, and/or friend needed to be at least 12 months prior to the study. The inclusion criteria for bereaved individuals did not require a specific symptom level. Bereaved people experiencing no to little complaints following the loss of their loved one were eligible for participation in the study as well. As for the clinicians, the aim was to encompass a wide variety of professions. Therefore, the inclusion criteria allowed participation from anyone working within mental healthcare, whether as a practitioner or intern, at a higher professional education or university level, irrespective of their work experience (with treating grief symptoms), work hours, or field of expertise.

Participant Recruitment

Bereaved people were approached using an invitation email. They have previously given their permission via a web page to be considered for participation in grief research. This website is aimed at providing information about research and grief treatment after a (sudden) loss (www.rouwbehandeling.nl). With respect to the clinicians, they were approached by way of flyer advertising and the researchers approached their professional network with the help of social media (e.g., LinkedIn). Moreover, the bereaved people were asked to share the study with other bereaved people, while the clinicians were requested to inform their colleagues about the research, leading to a process of snowball sampling.

Data Cleaning and Participant Exclusion Process

Amongst the bereaved people, one participant still contained a missing response due to

an error. Further inspection of this participant's answers called into question the authenticity of his responses, since he recurrently provided identical answers to questions and reported an inaccurate age of the deceased and date of death. This led to the omission of his data responses. Moreover, exclusion criteria were checked for, specifically the time frame of having lost a loved one. The cut-off was set at 12 months, meaning that all bereaved people who noted that the deceased passed away in the period between 08/04/2023 and 08/04/2024 (start date of data collection) were excluded from the study. This resulted in the exclusion of five participants. Amongst the clinicians, seven participants were removed because their answers to the scale-questions were not recorded due to a technical error. Moreover, one participant was retired and thus did not meet the criteria of currently working in mental healthcare. Additionally, one respondent did not speak Dutch and was a researcher. Another participant, a regression and reincarnation therapist, did not work in mental healthcare domain either. Therefore, they were excluded from the study as well.

Procedure

Bereaved people and clinicians were first questioned about their background characteristics and loss-related characteristics. Additionally, the grief reactions of the bereaved people were assessed by completing the TGI-SR+. In order to have a basic understanding of the use of deepfake in grief treatment bereaved people and clinicians were shown a brief video clip of the documentary that set up an experiment to re-connect bereaved people with their deceased loved ones through deepfakes (https://deeptherapy.ai/). A written explanation was offered as well (see Appendix A and B for the written explanation). Thereafter, the bereaved people had to complete 47 items and the clinicians 61 items related to barriers and facilitators and their intention to use deepfake technology in grief treatment. The study ended with the option to stay informed about the study through a newsletter and participants' willingness to participate in future follow-up interviews. After completing the

questionnaire, all participants were automatically referred to the webpage for grief support. The total duration of the study entailed approximately 20 minutes.

Measures

Intention to Use Deepfake Technology

The intention to use deepfake technology in grief treatment was measured using four items that were adapted from Etemad-Sajadi et al (2022), assessing the intention to use robots in a service delivery context. Psychometric properties of the original version have shown to be sufficient (Etemad-Sajadi et al., 2022). The original scale items, referring to 'a robot in a service delivery context,' were adapted to 'deepfake technology in grief treatment.' An example item is: "If I had access to deepfake technology in grief treatment, I would prefer to use it instead of grief treatment without deepfake technology.". The items were identical for both bereaved people and clinicians, except one: bereaved people were asked, "I would recommend to the people surrounding me to use deepfake technology in grief treatment.", while clinicians were asked, "I would recommend other psychologists to work with deepfake technology in grief treatment.". Higher scores on the scale implied greater intention to use deepfake technology in grief treatment. Cronbach's alpha was .92 for the sample of bereaved people and .71 for the sample of clinicians.

Deepfake Technology Adoption

A measurement instrument was created to assess factors influencing the intention to use deepfake technology in grief treatment. An extensive literature review was conducted to gain an understanding of the factors determining users' willingness to utilise new technologies in mental healthcare. A total of 13 to 16 relevant factors were identified (see Appendix D and E for an overview of the total number of items).

The items were modified (i.e., wording changes) to closely align with the aim of the current study. All measures were independently translated from English to Dutch by one of

the involved researchers, except for the items abstracted from the scales; openness towards the use of innovative technologies, perceived benefits, self-efficacy, and the self-developed scale measuring the negative psychological consequences of deepfake technology, as these were already available in Dutch. The back-translation method was applied as a quality control technique. The assessment tool entailed translating the Dutch survey items back into their original language (i.e., English) by a second independent researcher. The two original-language variants were then compared and adjustments were made to the Dutch translation to better capture the intended meaning of the original English items (Son, 2018). Forty-seven items had to be completed by bereaved people and 61 items by the clinicians, using a 5-point Likert scale, varying from 'totally disagree' (1) to 'totally agree' (5). The original 7-point Likert scale for assessing the openness towards the use of innovative technologies, intention to use, privacy and data protection, responsibility, and trust and safety was adjusted to a 5-point Likert scale for consistency.

Attitude

Acceptability. The Acceptability of Intervention Measure (AIM) was used to assess the acceptability (of implementing deepfake technology in grief treatment). The AIM consists of four items. These items stem from the acceptability scale that assesses the extent to which an innovation or treatment is perceived as satisfactory among implementation stakeholders (Weiner et al., 2017). Psychometric properties of the AIM are adequate (Weiner et al., 2017). The wording referring to 'intervention' was changed to 'deepfake technology in grief treatment'. The same items were used in both samples. For example, "Deepfake technology in grief treatment meets my approval.". Higher scores on the scale implied higher acceptability. Cronbach's alpha was .93 for the sample of bereaved people and .89 for the sample of clinicians.

Appropriateness. The Intervention Appropriateness Measure (IAM) was used to

assess the appropriateness (of implementing deepfake technology in grief treatment). The IAM consists of four items. These items stem from the appropriateness scale that assessed the extent to which an innovation or treatment is perceived as relevant and compatible by implementation stakeholders (Weiner et al., 2017). Psychometric properties of the IAM are adequate (Weiner et al., 2017). The wording referring to 'intervention' was changed to 'deepfake technology in grief treatment'. The same items were used in both samples. For example, "Deepfake technology in grief treatment seems like a good match.". Higher scores on the scale implied higher appropriateness. Cronbach's alpha was .95 for the sample of bereaved people and .88 for the sample of clinicians.

Concerns Regarding Data Security. Concerns regarding data security was measured using two items that were adapted from Ebert et al. (2015), originally assessing the acceptance of online mental health interventions among primary care patients with depressive symptoms. Psychometric properties of the original version are adequate (Ebert et al., 2015). The wording referring to 'an online-training' was changed to 'a deepfake session in grief treatment'. The first item was phrased differently for the bereaved people and clinicians. This item was as follows for the bereaved people "When I would participate in a deepfake-session in grief treatment, I would trust that all information I share would be treated in strict confidence.". For clinicians, this item was changed into "During a deepfake session, I would trust that all information shared by the patients would be treated in strict confidence.". The second item was identical for both samples. This item was reverse coded. Higher scores on the scale therefore implied lower concerns regarding data security. Cronbach's alpha was .61 for bereaved people and .77 for clinicians. The correlation between the two items was r = .44, p = < .001 in the sample of bereaved people and r = .63, p = < .001 in the sample of clinicians.

Privacy and Data Protection. Privacy and data protection was measured using two

items that were adapted from Etemad-Sajadi et al. (2022), originally assessing ethical issues in human-robot interactions. Psychometric properties of the original version have shown to be sufficient (Etemad-Sajadi et al., 2022). The wording of the items of the original scale that referred to ‘a robot in a service delivery context’ were changed into ‘deepfake technology in grief treatment’. The items were phrased differently for the bereaved people and clinicians. For the bereaved, the items were: (1) “I should be informed of how deepfake technology in grief treatment will use information about me.” and (2) “I don’t mind sharing personal information to create a deepfake of my loved one in the context of grief treatment.”. For clinicians, the items were: (1) “I think patients should be informed of how deepfake technology in grief treatment will use information about them.” and (2) “I think patients don’t mind giving personal information to create a deepfake of their loved ones in a grief treatment delivery context.”. The second item was reverse coded for both bereaved people and clinicians. Higher scores on the scale would therefore imply greater privacy and data protection. Cronbach’s alpha was not computed due to an error as the scale consisted of only two items. The correlation between the two items was $r = -.08$, $p = .388$ in the sample of bereaved people and $r = .03$, $p = .772$ in the sample of clinicians.

Responsibility. The responsibility (of third parties) was measured using two items that were adapted from Etemad-Sajadi et al. (2022), originally assessing ethical issues in human-robot interactions. Psychometric properties of the original version have shown to be sufficient (Etemad-Sajadi et al., 2022). The wording of the items of the original scale that referred to ‘a robot in a service delivery context’ were changed into ‘deepfake technology in grief treatment’ and ‘a client is wrongly informed by the robot’ to ‘a deceased individual is inaccurately portrayed or when incorrect information is provided’. The same items were used in both samples. For example: “I think the law, and subsequent punishment, should apply to deepfake technology in a grief treatment context.”. Higher scores on the scale implied greater

responsibility. Cronbach's alpha was .38 in the sample of bereaved people and .30 in the sample of clinicians. The correlation between the two items was r = .24, p = .006 in the sample of bereaved people and r = .18, p = .095 in the sample of clinicians.

Trust and Safety. Trust and safety was measured using three items that were adapted from an instrument that assessed ethical issues raised by human-robot interactions (Etemad-Sajadi et al., 2022). Psychometric properties of the original version has shown to be sufficient (Etemad-Sajadi et al., 2022). The wording of the items of the original scale that referred to 'a robot in a service delivery context' were changed such that they refer to 'deepfake technology in grief treatment'. For example, "I think that deepfake technology in grief treatment is vulnerable to hackers.". The items were the same for the bereaved people and clinicians, except for one item. This one item was as follows for bereaved people "I would hesitate to use deepfake technology in grief treatment out of fear to make mistakes that could harm me.". For clinicians, this item was changed into "I would hesitate to use deepfake technology in grief treatment out of fear of making mistakes that could harm my patients.". The second and third item were reverse coded for both bereaved people and clinicians. Higher scores on the scale would therefore imply greater trust and safety. Cronbach's alpha was .62 in the sample of bereaved people and .47 in the sample of clinicians.

Knowledge About Deepfake Technology in Grief Treatment. Knowledge about deepfake technology in grief treatment was measured using two items that were adapted from Ebert et al. (2015), originally assessing the acceptance of online mental health interventions among primary care patients with depressive symptoms. Psychometric properties of the original version are adequate (Ebert et al., 2015). The wording was changed to refer to "deepfake technology in grief treatment". For example, "I already had some knowledge about deepfake technology in grief treatment before participating in this research.". The second item was phrased as follows for bereaved people, "I have a clear picture of what I can expect

during a deepfake-session in grief treatment for coping with loss.", and for the clinicians, "I have a clear picture of what I can expect during a deepfake session in grief treatment for coping with a patient's loss.". Higher scores on the scale implied more knowledge about deepfake technology in grief treatment. Cronbach's alpha was .27 for the bereaved people and .58 for the clinicians. The correlation between the two items was $r = .16$, $p = .063$ in the sample of bereaved people and $r = .44$, $p = < .001$ in the sample of clinicians.

Openness Towards use Innovative Technologies. The Internet-based Interventions Acceptability Questionnaire was used to assess the openness towards the use of innovative technologies (Rai et al., 2013). The scale consists of three items measuring the level of one's readiness to experiment with new online services (Rai et al., 2013). Psychometric properties of the original instrument are adequate (Rai et al., 2013). No changes in wording were necessary. The same items were used in both samples. For example, "Among my friends and family, I am usually the first to try out new mobile services.". Higher scores on the scale implied more openness towards the use of innovative technologies. Cronbach's alpha was .89 in both samples.

Perceived Benefits. The eMental Health Adoption Readiness Scale was used to assess the perceived benefits of implementing deepfake technology in grief treatment (Feijt et al., 2021). The scale consists of seven items measuring the professional's view on the added value and suitability of eHealth for clinical practice (Feijt et al., 2021). Psychometric properties of the original instrument are adequate (Feijt et al., 2021). The items were used in the sample of clinicians. The wording referring to 'eHealth' was changed to 'deepfake technology in grief treatment' and 'healthcare provider' to 'psychologist'. For example, "Deepfake technology is an indispensable component of a psychologist's work.". Items 2, 4, 5, and 6 were reverse coded. Higher scores on the scale would therefore imply greater perceived benefits. Cronbach's alpha was .85 in the sample of clinicians.

Negative Psychological Consequences. The negative psychological consequences of deepfake on PGD patients was measured through six self-developed items. The scale was invented to take into account participants' attitudes with respect to long-term psychological implications of deepfake-therapy. The same items were used in both samples. For example, "I believe that the use of deepfake technology in grief treatment negatively impacts memories of the deceased.". Higher scores on the scale implied more perceived negative psychological consequences. Psychometric properties of the newly constructed scale have shown to be sufficient. Cronbach's alpha was .87 in the sample of bereaved people and .83 in the sample of clinicians.

Subjective Norm

Social Influence. Social influence was assessed among bereaved people and clinicians using different instruments. For the bereaved people, social influence was measured using four items that were adapted from a scale that assessed the opinions from participants' social networks regarding Internet-based interventions (Ebert et al., 2015). Psychometric properties of the original version are adequate (Ebert et al., 2015). The wording referring to 'an Internet-based training' was changed to 'a deepfake session in grief treatment' and 'mental health problems' to 'the loss of a loved one'. For example, "Others would think badly about me if I would use deepfake technology in grief treatment for coping with the loss of my loved one.". This fourth item was reverse coded. Higher scores on the scale would therefore imply greater social influence (in terms of social support). Cronbach's alpha was .62 for the bereaved people.

For the clinicians, social influence was measured using three items that were adapted from a scale that assessed the extent to which a person believes that using new technologies aligns with the attitudes of their social circle (Alzahrani, 2021). Psychometric properties of the original version are adequate (Alzahrani, 2021). The wording referring to 'VR (for MH

treatment)' was changed to 'deepfake technology in grief treatment' and 'new technologies' to 'deepfake technology'. For example, "I expect psychologists to be anxious of using deepfake technology in grief treatment.". Higher scores on the scale implied higher social influence (in terms of negative opinions). Cronbach's alpha was .76 for the clinicians.

Facilitating Conditions. Facilitating conditions was measured using three items that were adapted from a scale that assessed the extent to which people believe that an organisation's technological infrastructure facilitates adoption of a new technology (Alzahrani, 2021). Psychometric properties of the original version are adequate (Alzahrani, 2021). The items were used for the clinicians. The wording referring to 'VR (in MH treatment)' was changed to 'deepfake technology in grief treatment' and 'this technology' to 'deepfake technology'. For example, "I think integrating deepfake technology into my workplace will be easy.". Items 1, 2, and 4 were reverse coded. Higher scores on the scale therefore implied greater facilitating conditions. Cronbach's alpha was .70 for the clinicians.

Perceived Behavioural Control

Feasibility. The Feasibility of Intervention Measure (FIM) was used to assess the feasibility (of implementing deepfake technology in grief treatment). The FIM consists of four items measuring the extent to which an innovation or treatment can be successfully adopted within a specific setting (Weiner et al., 2017). Psychometric properties of the FIM are adequate (Weiner et al., 2017). The wording referring to 'intervention' was changed to 'deepfake-technology in grief treatment'. The same items were used in both samples. For example, "Deepfake technology in grief treatment seems possible.". Higher scores on the scale implied higher feasibility. Cronbach's alpha was .92 in the sample of bereaved people and .88 in the sample of clinicians.

Self-Efficacy. The eMental Health Adoption Readiness Scale was used to assess the self-efficacy beliefs of clinicians. The scale consists of three items measuring the

professionals' eHealth adoption readiness based on subjective beliefs in their abilities to accomplish a certain goal (Feijt et al., 2021). Psychometric properties of the original instrument are adequate (Feijt et al., 2021). The items were used in the sample of clinicians. The wording referring to 'eHealth' was changed to 'deepfake technology in grief treatment' and 'healthcare provider' to 'psychologist'. For example, "I expect that using deepfake technology will come easily to me.". Item 3 was reverse coded. Higher scores on the scale would therefore imply greater self-efficacy. Cronbach's alpha was .86 for the clinicians.

Performance Expectancy. Performance expectancy was assessed among bereaved people and clinicians using different instruments. For the bereaved people, performance expectancy was measured using four items that were adapted from a scale that assessed the expected advantages of Internet-based interventions for personal healthcare (Ebert et al., 2015). Psychometric properties of the original version are adequate (Ebert et al., 2015). The wording referring to 'an Internet-based training' was changed to 'a deepfake session in grief treatment' and 'mental health problems' to 'the loss of a loved one'. For example, "Using deepfake technology in grief treatment would reduce my grief complaints.". Higher scores on the scale implied higher performance expectancy. Cronbach's alpha was .97 for the bereaved people.

For the clinicians, performance expectancy was measured using six items that were adapted from a scale that assessed the expected enhancement of work performance as a result of the technology (Alzahrani, 2021). Psychometric properties of the original version are adequate (Alzahrani, 2021). The wording referring to 'VR (in MH treatment)' was changed to 'deepfake technology in grief treatment' and 'this technology' to 'deepfake technology'. For example, "Using deepfake technology will improve the quality of grief treatment.". Items 4 and 5 were reverse coded. Higher scores on the scale would therefore imply higher performance expectancy. Cronbach's alpha was .59 for the clinicians.

Effort Expectancy. Effort expectancy was assessed among bereaved people and clinicians using different scales. For the bereaved people, effort expectancy was measured using three items that were adapted from a scale that assessed the expected ease of use of Internet-based interventions (Ebert et al., 2015). Psychometric properties of the original version are adequate (Ebert et al., 2015). The wording referring to 'an Internet-based (depression) training' was changed to 'a deepfake session in grief treatment' and 'mental health problems' to 'the loss of a loved one'. For example, "Deepfake technology in grief treatment would be clear and easy to understand for me.". Item 1 was reverse coded. Higher scores on the scale would therefore imply lower effort expectancy. Cronbach's alpha was .50 for the bereaved people.

For the clinicians, effort expectancy was measured using two items that were adapted from a scale that assessed the anticipated ease of use regarding a new technology (Alzahrani, 2021). Psychometric properties of the original version are adequate (Alzahrani, 2021). The wording referring to 'VR (in MH treatment)' was changed to 'deepfake technology in grief treatment'. For example, "I think it will be easy for me to learn how to use deepfake technology in grief treatment.". Higher scores on the scale implied lower effort expectancy. Cronbach's alpha was .73 for the clinicians. The correlation between the two items was r = .57, p = < .001.

Background and Loss-Related Characteristics

For the bereaved people, 11 questions about background characteristics covered demographics (i.e., age, gender, country of birth, and education), and details about previous and/or current use of psychotherapy and deepfake technology in treatment, as well as their wish for psychological support and their knowledge of deepfake technology. The loss-related characteristics included kinship to the deceased, cause of death, time since the loss, age of the deceased, and the degree of expectancy related to the loss. Response options were provided,

for instance regarding the kinship to the deceased: 1 = partner, 2 = child, 3 = father/mother, 4 = brother/sister, 5 = grandfather/grandmother, 6 = grandchild, 7 = friend, and 8 = other.

The categorical responses were recoded to appear as dichotomous variables. Gender was recoded as 0 = male and 1 = female. The variables concerning (previous) psychological support or support from the use of deepfake technology, were recoded as 0 = no and 1 = yes. Country of birth was recoded as 0 = other than the Netherlands and 1 = the Netherlands, education as 0 = other than university and 1 = university (of applied sciences), kinship to the deceased as 0 = other than partner/spouse or child and 1 = partner/spouse or child, and cause of death was dichotomised into 0 = unnatural and 1 = natural.

For the clinicians, 16 questions about background characteristics addressed demographics (i.e., age, gender, country of birth, and education), job function, workplace, years in practice, number of work hours per week, specialisation, experience with treating grief symptoms and using deepfake technology in psychological or grief treatment, and their knowledge of deepfake technology. Response options were provided in relation to, for instance, the number of active work years in the field of mental healthcare since graduation: 1 = less than 5 years, 2 = 5-10 years, 3 = 11-15 years, 4 = 16-20 years, 5 = more than 20 years.

As for the clinicians recoding of the values affected gender, country of birth, and education in the same manner as for the bereaved people. Job function was recoded into 0 = not registered as psychologist and 1 = registered as psychologist. Workplace was dichotomised into 0 = independent practice and 1 = institutional practice. The mental health disorders treated by the clinicians were recoded as 0 = other than trauma- and stressor-related disorders and 1 = trauma- and stressor-related disorders. Experience with treating (prolonged) grief symptoms, experience with using deepfake technology in psychological and/or grief treatment, and previous knowledge about deepfake technology were all recoded as 0 = no and 1 = yes.

Prolonged Grief Severity

The Traumatic Grief Inventory-Self Report Plus (TGI-SR+) was employed to measure the grief reactions of the bereaved people (Lenferink et al., 2022). PGD as defined in DSM-5-TR can be assessed through the self-reporting of 22 questions. These statements signify PGD and additional disturbed grief reactions, for instance “I had trouble accepting the loss.” and “I felt that life is unfulfilling or meaningless without him/her.” (Lenferink et al., 2022) (see Appendix C for the complete TGI-SR+). Participants were asked to indicate the extent to which they experienced the grief reaction in the past month, on a 5-point Likert scale, ranging from ‘never’ (1) to ‘always’ (5). Obtainment of a score of 71 or higher, after summing the scores on all 22 items, implies the presence of PGD (Lenferink et al., 2022). Lenferink et al. (2022) found that the self-assessment tool is a valid and reliable instrument for measuring DSM-5-TR PGD. They identified a Cronbach’s alpha coefficient of .75, indicating high internal consistency.

Statistical Analysis

RStudio (2024.04.0+735) was employed as a statistical software programme to examine the acquired survey responses from the bereaved people and clinicians. Two datasets were created to facilitate examination of the individual intentions of bereaved people and clinicians. It was intended to prevent missing responses by utilising ‘forced’ responses in the questionnaire. After the final datasets were determined upon, descriptive statistics were performed with respect to the background and loss-related characteristics collected from the participants.

The analysis consisted of three steps. First, the possible correlates of intention to use deepfake were examined independently to assess the relationship between each correlate and the intention to use deepfake technology in grief treatment. Spearman’s correlation coefficients were computed to examine the associations between the continuous variables,

since the intention to use deepfake technology in grief treatment was found to not be normally distributed, following the outputs from the histogram, QQ plot, and Shapiro-Wilk test. Independent samples t-tests were computed comparing the dichotomous background and loss-related characteristics and the intention to use. Thereafter, the correlates that were significantly associated (i.e., $p < .05$) with the intention to use deepfake technology were included in a multiple regression model.

Second, the associations between the significant independent variables were examined to check the assumption of no multicollinearity (Field et al., 2012). Pearson's correlation, point-biserial correlations, and phi coefficients were computed for the varying (i.e., continuous and binary categorical) variables. For the bereaved people, none of the independent variables correlated too strongly (i.e., $r > .90$) (see Appendix F for the intercorrelations). Moreover, the variance inflation factor (VIF) was computed in relation to the main correlates (Shrestha, 2020). The VIF values in the bereaved people dataset generally did not give cause for concern as their values were between 1 and 5. However, the VIF values of acceptability was 6.73 and the value of appropriateness was 7.03, indicating high correlations. These variables were not removed as their correlation was .87 and therefore did not exceed .90. For the clinicians, none of the independent variables correlated too highly (see Appendix G for the intercorrelations). Their VIF values did not give any cause of concern as their values were all between 1 and 5.

Third, the multiple regression analysis was executed separately for both the bereaved people and clinicians. Multiple regression analysis was conducted for both bereaved people and clinicians to examine the association between their background, loss-related characteristics, technology adoption factors (independent variables), and their intention to use deepfake technology in grief treatment (dependent variable). Several assumptions have been checked for in both regression models, such as the assumption of non-zero variance,

independent errors, and normality of residuals (Field et al., 2012). For both the bereaved people and the clinicians, all assumptions were met.

Sample Size and Power Calculation

An a priori power analysis for linear multiple regression determined the appropriate sample size. Bereaved individuals were asked about 11 background and loss-related characteristics (including prolonged grief severity) and 13 factors related to their willingness to adopt deepfake technology. Clinicians were asked about eight background characteristics and 16 factors related to their willingness to adopt deepfake technology. From 24 initial predictors, a subset of 10 was expected to significantly correlate with the intention to use deepfake technology in grief treatment. The power analysis, using G*Power version 3.1.9.7, indicated that a sample of 118 participants per group (bereaved individuals and clinicians) was needed to achieve 80% power to detect a medium effect ($f^2 = 0.15$) at a significance level of $\alpha = .05$.

Results

Background and Loss-Related Characteristics of Bereaved People

The bereaved sample consisted of 136 bereaved people (see Table 1). Their age ranged from 22 to 88 (*M*age = 55.15, *SD*age = 12.67). More than four out of five bereaved people identified as female (85.29%). Eighty-six bereaved people (63.24%) reported that they have received help from a psychologist, therapist, or psychiatrist in relation to the death of their loved one. However, none of these participants have obtained support in grief treatment via deepfake technology yet. More than half of the bereaved people lost a partner (63.97%). In two-thirds of the cases, the cause of death was a physical illness (65.44%). The ‘other’ category includes causes of death such as surgical error, hospital negligence, substance abuse, euthanasia, and an unknown cause. Time since loss varied from 13 months to 46 years. Nineteen bereaved people (13.97%) scored above the cut-off (≥ 71) for PGD. The average

mean score of bereaved people on the intention to use deepfake technology in grief treatment was 10.3 (*SD* = 4.4). From the total sample (*N* = 136), 34 bereaved people (25%) reported an intention to use deepfake technology in grief treatment if they would have it to their access (score of 4 or 5 on the first item of the intention to use deepfake technology measure).

Table 1

Background and Loss-Related Characteristics of Bereaved People (N = 136)

Sample Characteristics		
Age, *M* (*SD*)	55.15	12.67
Gender, *N* (*%*)		
Male	20	14.71
Female	116	85.29
Other	0	0.00
Country of birth, *N* (*%*)		
The Netherlands	132	97.06
Other	4	2.94
Education, *N* (*%*)		
Elementary school	0	0.00
Secondary school	13	9.56
Vocational education	36	26.47
Higher professional education/university education	87	63.97
Recruitment, *N* (*%*)		
Invitation email	109	85.85
Referral of an acquaintance	4	3.08
Social media	10	7.69
Other	7	5.38
Previous support from a psychologist, psychotherapist or psychiatrist preceding the loss, *N* (*%*)		
No	78	57.35
Yes	58	42.65
Previous grief support from a psychologist, psychotherapist or psychiatrist, *N* (*%*)		
No	50	36.76
Yes	86	63.24
Previous support from deepfake technology in grief treatment, *N* (*%*)		
No	136	100.00
Yes	0	0.00
Current grief support from a psychologist, psychotherapist or psychiatrist, *N* (*%*)		
No	115	84.56
Yes	21	15.44
Wish to receive grief support from a psychologist, psychotherapist or psychiatrist, *N* (*%*)		
No	94	69.12

Yes	42	30.88
Prior knowledge about deepfake technology, *N* (*%*)		
No	66	48.53
Yes	70	51.47
Deceased is, *N* (*%*)		
Partner	87	63.97
Child	11	8.09
Father/mother	21	15.44
Brother/sister	10	7.35
Grandparent	3	2.21
Grandchild	0	0.00
Friend	3	2.21
Other	1	0.74
Cause of death, *N* (*%*)		
Physical illness	89	65.44
Accident	7	5.15
Suicide	17	12.50
Murder or manslaughter	1	0.74
Other	22	16.18
Time since loss (in months), *M (SD)*	60.23	70.2
Age of the deceased, *M* (*SD*)	56.19	18.20
Expectancy of death, *N* (*%*)		
Completely expected	22	16.18
A little unexpected	23	16.91
Quite unexpected	22	16.18
Very unexpected	19	13.97
Completely unexpected	50	36.76
Prolonged grief severity, *M* (*SD*)	54.3	15.7

Note. *N* = number of cases, *%* = percentage, *M* = mean, *SD* = standard deviation.

Univariate Associations Between Independent Variables and Intention to Use for Bereaved People

Regarding the background and loss-related characteristics of the bereaved people, it was found that those who reported wishing to receive grief support from a psychologist, psychotherapist, or psychiatrist had a greater intention to use deepfake technology in grief treatment. Bereaved people who lost their partner/spouse or child showed lower intention to use deepfake technology in grief treatment compared with people who lost other loved ones. None of the other background and loss-related characteristics were significantly related to the intention to use deepfake technology in grief treatment. See Table 2 for associations between each categorical correlate and intention to use deepfake technology in grief treatment.

Table 2

Independent Samples T-test for Continuous Intention to Use with Dichotomous Independent Variables Among Bereaved People (N = 136)

Variable	*M*		95% CI	*t*	*df*	*p*
	0	1				
Education[a]	2.67	2.50	[-0.23, 0.57]	0.84	99.57	.402
Previous support from a psychologist, psychotherapist or psychiatrist preceding the loss[b]	2.63	2.47	[-0.22, 0.54]	0.85	123.18	.399
Wish to receive grief support from a psychologist, psychotherapist or psychiatrist[b]	2.43	2.87	[-0.83, -0.05]	-2.26	84.02	.026
Prior knowledge about deepfake technology[b]	2.66	2.48	[-0.19, 0.55]	0.96	133.98	.341
Kinship to the deceased[c]	2.91	2.43	[0.10, 0.86]	2.52	81.16	.014
Cause of death[d]	2.53	2.58	[-0.45, 0.36]	-0.23	88.46	.819

Note. *M* = mean, CI = confidence interval, *t* = t-test statistic, df = degrees of freedom, *p* = significance. [a] as 0 = other than university, 1 = university (of applied sciences). [b] 0 = no, 1 = yes. [c] 0 = other than partner/spouse or child, 1 = partner/spouse or child. [d] 0 = unnatural, 1 = natural.

Amongst the attitude factors, it was found that bereaved people who reported higher acceptability, appropriateness, openness towards the use of innovative technologies, trust and safety, and lower concerns regarding data security had a greater intention to use deepfake technology in grief treatment. Bereaved people who reported higher privacy and data protection and negative psychological consequences were less likely to intend to use deepfake technology in grief treatment. None of the other attitude factors were significantly related to the intention. See Table 3 for associations between each continuous correlate and intention to use deepfake technology in grief treatment.

Amongst the subjective norm factor, it was found that bereaved people who reported higher social influence had greater intention to use deepfake technology in grief treatment (see Table 3). Amongst the perceived behavioural control factors, it was found that bereaved people who reported higher feasibility, performance expectancy, and effort expectancy had greater intention to use deepfake technology in grief treatment. This implies that those who

believed that deepfake technology can be successfully adopted in grief treatment, will lead to personal benefits, and is easy to use, reported higher intentions to use the technology (see Table 3).

Table 3
Correlations Analysis Between the Continuous Intention to Use and the Continuous Independent Variables by Participant Group

Variable	Correlation coefficient with intention to use	
	Bereaved people (N = 136)	Clinicians (N = 91)
Age	-.14	-.06
Time since loss	-.04	-
Age of the deceased	-.02	-
Expectancy of the death	-.12	-
Prolonged grief severity	.13	-
Number of years employed in mental healthcare field	-	-.06
Number of patients treated (per week)	-	.02
Number of work hours (per week)	-	-.00
Acceptability	.89***	.81***
Appropriateness	.83***	.73
Openness towards use innovative technologies	.32***	.18***
Concerns regarding data security	.34***	.08
Privacy and data protection	-.53***	-.14
Responsibility	-.09	-.20
Trust and safety	.63***	.37***
Knowledge about deepfake technology in grief treatment	.10	-.02
Perceived benefits	-	.72***
Negative psychological consequences	-.59***	-.43***
Social influence	.60***	-.12
Feasibility	.64***	.37***
Self-efficacy	-	.08***
Performance expectancy	.90***	.65***
Effort expectancy	.52***	.49
Facilitating conditions	-	.05

Note. Cells contain Spearman rank-order correlation (ρ), since the dependent variable is not normally distributed.
*** $p < .001$.

Multiple Linear Regression Analysis Predicting Intention to Use for Bereaved People

A multiple regression analysis was run to study the predictive value of the independent variables with respect to bereaved people their intention to use deepfake technology in grief treatment. A significant model was observed for the bereaved people, $F(13, 122) = 81.47$, $p <$ 001. The independent variables explained 90% of the variance in the intention to use deepfake technology in grief treatment, based on a R2 of .90. Findings showed that acceptability, appropriateness, social influence, and performance expectancy were significant correlates of the intention to use deepfake technology in grief treatment. The other independent variables did not show to be significant correlates. See Table 4 for the multiple regression coefficients.

Table 4

Multiple Linear Regression Predicting Intention to Use for Bereaved People (N = 136)

Variable	*B*	*SE*	95% CI	β	t	*p*
Constant	-0.31	0.52	[-1.35, 0.72]		-0.60	.551
Kinship to the deceased[a]	-0.09	0.07	[-0.24, 0.06]	-.02	-1.23	.220
Wish to receive grief support from a psychologist, psychotherapist or psychiatrist[b]	-0.05	0.08	[-0.20, 0.10]	-.08	-0.69	.490
Acceptability	0.30	0.07	[0.15, 0.45]	.32	4.02	< .001
Appropriateness	0.19	0.08	[0.03, 0.35]	.26	2.31	.022
Openness towards use innovative technologies	0.02	0.04	[-0.06, 0.10]	.06	0.59	.557
Concerns regarding data security	-0.02	0.05	[-0.11, 0.07]	-.01	-1.08	.644
Privacy and data protection	-0.02	0.06	[-0.14, 0.10]	-.01	-0.29	.774
Trust and safety	0.05	0.08	[-0.10, 0.20]	-.03	0.63	.531
Negative psychological consequences	0.02	0.06	[-0.11, 0.14]	.03	0.26	.792
Social influence	0.16	0.07	[0.02, 0.31]	.11	2.27	.025
Feasibility	-0.03	0.06	[-0.15, 0.09]	-.04	-0.82	.634
Performance expectancy	0.46	0.06	[0.34, 0.58]	.42	7.80	< .001
Effort expectancy	0.04	0.05	[-0.06, 0.15]	.08	0.78	.436

Note. B = estimated regression coefficient, *SE* = standard error, CI = confidence interval, β = standardised regression coefficient, *p* = significance.

[a] 0 = other than partner/spouse or child, 1 = partner/spouse or child. [b] 0 = no, 1 = yes.

Background Characteristics of Clinicians

The clinicians sample consisted of 91 experts working in Dutch mental healthcare (see Table 5). They had an age range of 21 to 66 (*M*age = 39.30, *SD*age = 11.82). The sample primarily comprised highly educated (100%) females (*N* = 76). Trauma- and stressor-related disorders were among the most frequent treated disorders by the clinicians (*N* = 28). Approximately two-third of the clinicians had experience with treating (prolonged) grief symptoms (73.63%). Yet only one clinician had experience with utilising deepfake technology in grief treatment. The average mean score of clinicians on the intention to use deepfake technology in grief treatment was 11.3 (*SD* = 2.9). From the total sample (*N* = 91), 41 clinicians (45.06%) reported an intention to use deepfake technology in grief treatment if they would have it to their access (score of 4 or 5 on the first item of the intention to use deepfake technology measure).

Table 5
Background Characteristics of Clinicians (N = 91)

Sample Characteristics		
Age, *M* (*SD*)	39.30	11.82
Gender, *N* (*%*)		
Male	15	16.48
Female	76	83.51
Other	0	0.00
Country of birth, *N* (*%*)		
The Netherlands	83	91.21
Other	8	8.79
Education, *N* (*%*)		
Elementary school	0	0.00
Secondary school	0	0.00
Vocational education	0	0.00
Higher professional education/university education	91	100.00
Recruitment, *N* (*%*)		
Social media	15	16.48
Invitation email	61	67.03
Referral of a colleague	10	10.99
Other	5	5.49
Job function, *N* (*%*)		
Master student	3	3.30
PhD student	1	1.10
Social worker	1	1.10

Counsellor	1	1.10
Psychotherapist	6	6.59
Basic psychologist/psychologist NIP	32	35.16
GZ-psychologist	28	30.77
Clinical psychologist	6	6.59
POH-GGZ	2	2.20
Psychiatrist	2	2.20
Other	9	9.90
Workplace, *N* (*%*)		
Owner and practitioner of own private practice for therapists/psychologists without staff	8	8.79
Owner and practitioner of own private practice for therapists/psychologists with staff	0	0.00
Practitioner at a small mental healthcare institution (0-49 employees)	8	8.79
Practitioner at a large mental healthcare institution (50-100 employees)	11	12.09
Combination of the options described above	59	64.84
Other	5	5.49
Years employed in mental healthcare field, *N* (*%*)		
Less than 5 years	24	26.37
5-10 years	24	26.37
11-15 years	17	18.68
16-20 years	9	9.89
More than 20 years	17	18.68
Number of patients treated (per week), *M*(*SD*)	16.85	6.78
Number of work hours (per week), *N* (*%*)		
Less than 8 hours	5	5.49
8-16 hours	16	17.58
24-32 hours	25	27.47
24-32 hours	33	36.26
32-40 hours	12	13.19
More than 40 hours	n.a.	n.a.
Mental health disorders, *N* (*%*)		
Anxiety disorders (e.g., specific phobias and panic disorders)	9	9.89
Trauma- and stressor-related disorders (e.g., PTSD, grief)	28	30.77
Depressive disorders	14	15.38
Neurodevelopmental disorders (e.g., ASD, ADHD)	4	4.40
Personality disorders	7	7.69
Substance use disorders	1	1.10
Neurocognitive disorders	n.a.	n.a.
Somatic symptom disorder and related disorders	16	17.58
Eating disorders	1	1.10
Dissociative disorders	n.a.	n.a.
Schizophrenia spectrum and other psychotic disorders	n.a.	n.a.
Disruptive, impulse-control, and conduct disorders	1	1.10

Bipolar and related disorders	n.a.	n.a.
Obsessive-compulsive and related disorders	2	2.20
Other	8	8.79
Experience with treating grief complaints, *N* (*%*)		
No	24	26.37
Yes	67	73.63
Average weekly treatment time for (prolonged) grief symptoms (in %), *M* (*SD*)	17.71	20.11
Deepfake technology use in psychological treatment, *N* (*%*)		
No	90	98.90
Yes	1	1.10
Deepfake technology use in grief treatment, *N* (*%*)		
No	90	98.90
Yes	1	1.10
Prior knowledge about deepfake technology, *N* (*%*)		
No	21	23.08
Yes	70	76.92

Note. N = number of cases, *%* = percentage, *M* = mean, *SD* = standard deviation. n.a. = not applicable (answer option was not selected by the clinicians).

Univariate Associations Between Independent Variables and Intention to Use for Clinicians

Regarding the background characteristics of the clinicians it was found that none of the background characteristics were significantly related to the intention. See Table 6 for associations between each categorical correlate and the intention to use deepfake technology in grief treatment.

Table 6

Independent Samples T-test for Continuous Intention to Use with Dichotomous Independent Variables Among Clinicians (N = 91)

Variable	*M*		95% CI	*t*	*df*	*p*
	0	1				
Job function[a]	2.83	2.81	[-0.29, 0.32]	0.11	87.92	.911
Mental health disorders[b]	2.81	2.83	[-0.37, 0.34]	-0.09	44.37	.925
Experience with treating grief complaints[c]	2.93	2.78	[-0.20, 0.50]	0.85	40.10	.400
Prior knowledge about deepfake technology[c]	2.87	2.80	[-0.29, 0.42]	0.38	35.23	.7.08

Note. Independent samples t-tests comparing categorical independent variables and the continuous dependent variable (intention to use) are shown. *M* = mean, CI = confidence interval, *t* = t-test statistic, df = degrees of freedom, *p* = significance. [a] 0 = not registered as psychologist, 1 =

registered as psychologist. [b] 0 = other than trauma- and stressor-related disorders, 1 = trauma- and stressor-related disorders. [c] 0 = no, 1 = yes.

Amongst the attitude factors, it was found that clinicians who reported higher acceptability, appropriateness, perceived benefits, and trust and safety had a greater intention to use deepfake technology in grief treatment. Clinicians who reported higher negative psychological consequences were less likely to intend to use deepfake technology in grief treatment. None of the other attitude factors were significantly related to the intention to use deepfake technology in grief treatment. See Table 3 for associations between each continuous correlate and intention to use deepfake-technology in grief treatment.

Amongst the subjective norm factors, it was found that none of these correlates were significantly related to the intention to use deepfake technology in grief treatment (see Table 3). Amongst the perceived behavioural control factors, it was found that clinicians who reported higher feasibility, performance expectancy, and effort expectancy had greater intention to use deepfake technology in grief treatment. This implies that those who believed that deepfake technology can be successfully adopted in grief treatment, will lead to improved work performance, and is easy to use, reported higher intentions to use the technology. Self-efficacy was not significantly related to the intention to use deepfake technology in grief treatment (see Table 3).

Multiple Linear Regression Analysis Predicting Intention to Use for Clinicians

A multiple regression analysis was run to study the predictive value of the independent variables with respect to clinicians their intention to use deepfake technology in grief treatment. A significant model was observed for the clinicians, $F(8, 82) = 35.09$, $p < .001$. The independent variables explained 77% of the variance in the intention to use deepfake technology in grief treatment, based on a R^2 of .77. Acceptability and effort expectancy were

found to be significantly related to the intention to use deepfake technology in grief treatment. The other independent were not significantly related to the intention to use deepfake technology in grief treatment. See Table 7 for the multiple regression coefficients.

Table 7

Multiple Linear Regression Predicting Intention to Use for Clinicians (N = 91)

Variable	*B*	*SE*	95% CI	β	t	*p*
Constant	-0.55	0.5	[-1.58, 0.48]		-1.06	.293
Acceptability	0.38	0.09	[0.21, 0.56]	.38	4.31	< .001
Appropriateness	0.17	0.09	[-0.01, 0.35]	.17	1.89	.063
Trust and safety	0.06	0.08	[-0.10, 0.22]	.06	0.79	.439
Perceived benefits	0.15	0.10	[-0.06, 0.35]	.15	1.43	.158
Negative psychological consequences	0.04	0.07	[-0.11, 0.19]	.04	0.50	.619
Feasibility	0.03	0.06	[-0.10, 0.16]	.03	0.49	.624
Performance expectancy	0.11	0.14	[-0.18, 0.39]	.11	0.75	.457
Effort expectancy	0.16	0.05	[0.06, 0.27]	.16	3.08	.003

Note. *B* = estimated regression coefficient, *SE* = standard error, CI = confidence interval, β = standardised regression coefficient, *p* = significance.

Discussion

The aim of this cross-sectional survey-study was to explore the extent to which background characteristics, loss-related characteristics, and technology adoption factors relate to bereaved people and clinicians their intention to use deepfake technology in grief treatment. This was examined in a sample of 136 Dutch adults who lost a loved one at least 12 months prior to the study and to 91 Dutch mental healthcare clinicians.

One out of four (25.00%) bereaved people and approximately one out of two (45.06%) clinicians have the intention to use deepfake technology in grief treatment. This demonstrates interest in deepfake therapy and sets the stage for further exploration of its implementation. Previous research indicates that 35% of bereaved people would consider online grief support if needed. While there is notable interest in innovative grief treatments, deepfake technology's appeal is thus somewhat lower compared to established online grief treatments. Additionally, Molfenter et al. (2021) reported that 88.1% of mental health providers intended to use video

technologies and 89.8% intended to use phone technologies. Research also shows an increase in professionals their perceived value towards and use of digital mental health following the Covid-19 pandemic (Feijt et al., 2023), reflecting a broader trend amongst clinicians towards the acceptance of digital innovations in mental healthcare.

Bereaved people and clinicians were found to differ in the factors associated with their intention to use deepfake technology. Performance expectancy, a perceived behavioural control determinant (i.e., one's perspective on the extent to which using deepfake technology is effortless), was found to be the strongest correlate of bereaved people their intention to use deepfake technology when taking all relevant factors into account. This means that the bereaved people who believed that deepfake would benefit their personal healthcare, tended to report the greatest intention to use the technology in grief treatment. In line with previous research, Li et al. (2024) found that performance expectancy was positively associated with the intention to adopt AI chatbots among non-users and significantly related to the intention to continue using them among experienced users in mental healthcare. As in the present study, other investigations have found evidence for the role of performance expectancy as the best predictor of information technology acceptance in terms of usage intentions (Mitchell et al., 2022; Venkatesh et al., 2003). This suggests that bereaved people in this study who intended to use deepfake technology perceived significant benefits for their personal healthcare. This aligns with the potential role of Virtual Reality in accelerating the grieving process and reducing symptoms, as well as the speculated effect of deepfake technology to induce feelings of rest by enabling reconnection with the deceased through the simulated videos (Munnichs, 2020; Pizzoli et al., 2021).

Regarding the bereaved people, more acceptability and appropriateness (i.e., satisfaction and relevance), as well as greater social influence (i.e., social support) were also related to increased intentions to use deepfake technology in grief treatment, when taking all

relevant factors into account. Acceptability emerged as a crucial attitude determinant (i.e., the extent to which a person views the use of deepfake technology as positive or negative), consistent with previous research indicating its importance in the successful uptake of e-mental health interventions (Apolinário-Hagen et al., 2017; Kaltenthaler et al., 2008; Proctor et al., 2010). Complementary to this, appropriateness as significant attitude determinant, is supported by previous findings on its role in technology adoption (Apolinário-Hagen et al., 2017). Bereaved people their perceived acceptability and appropriateness of deepfake technology in grief treatment might be attributed to the idea that deepfake technology aligns with their emotional and therapeutic needs, fostering a healthy connection to the deceased as well as potentially facilitating symptom reduction and/or finding closure (Rando, 1993; Munnichs, 2020; Lenferink et al., 2021). Furthermore, social influence as subjective norm determinant (i.e., social expectations about using deepfake technology) showed a significant correlation with the intention to use deepfake technology. This is in line with evidence indicating that social norms and support networks play a crucial role in shaping individuals' willingness to adopt new technologies (Schepers & Wetzels, 2007). In the context of grief treatment, the importance of social support networks in the grieving process may amplify this significant influence, as these networks might impact the willingness to adopt novel technologies (Cacciatore et al., 2021).

Regarding the clinicians, acceptability (attitude determinant) was the strongest correlate of their intention to use deepfake technology in grief treatment when taking all relevant factors into account. This means that clinicians who viewed deepfake technology as satisfactory showed the greatest intention to use it. Previous research has also demonstrated that acceptability strongly influences the intention to use e-mental health services among both the general public and healthcare professionals (Apolinário-Hagen et al., 2017; Braun et al., 2022; Vis et al., 2018). Perhaps, the clinicians focusing on the bereaved people's needs may

led them to see deepfake therapy as an innovative and acceptable method to address emotional needs, ‘exposing’ PGD patients to otherwise impossible situations (Feijt et al., 2018; Lal & Adair, 2014; Segal et al., 2011). Here, clinicians who recognised benefits for PGD patients and perceived deepfake technology as compliant with the nature and complexity of PGD, may have perceived more acceptability towards the technique (Feijt et al., 2018). This idea aligns with the ethical imperative to provide compassionate care tailored to the unique circumstances of grief and loss (Jordan & Litz, 2014).

Regarding the clinicians, more effort expectancy (i.e., ease of use), a perceived behavioural control factor, was also related to increased intentions to use deepfake technology in grief treatment, when taking all relevant factors into account. Research has often found performance expectancy (e.g., perceived usefulness and benefits), rather than effort expectancy, to be more influential in determining the uptake of e-mental health interventions (Apolinário-Hagen et al., 2017; Chrismar & Wiley-Patton, 2006; Kaltenthaler et al., 2008; Van Der Vaart et al., 2016). Effort expectancy, broadly conceptualised to include perceived ease of use, complexity, and actual ease of use, plays a significant role in this study because integrating deepfake technology into clinical practice may demand ease of use and manageable complexity (De Veirman et al., 2022; Venkatesh et al., 2003). Clinicians their unfamiliarity with this emerging technology might, therefore, highlight the need for additional training, making effort expectancy a key factor in their willingness to adopt it.

A striking result was that amongst the attitude related factors, none of the ethical concerns predicted bereaved people and clinicians their intention to use deepfake technology. This aligns with Li et al. (2024), who found privacy concerns unrelated to adopting AI chatbots. The perceived benefits of reconnecting with deceased loved ones, which has been highlighted to be their strong desire (Pizzoli et al., 2021), might overshadow ethical concerns. There may also be a lack of awareness about the risks associated of this emerging technology

(Westerlund, 2019). Furthermore, weak correlations between, the two-item ethical scales were observed, highlighting their poor reliability. These scales were adopted from a measurement instrument aimed at robots (Etemad-Sajadi et al., 2022). Future qualitative research, such as focus groups or interviews, is needed to develop adoption scales specifically for deepfake technology. Setting up focus groups with bereaved people and clinicians could also provide crucial insights into the themes essential for participation in deepfake therapy (Powell & Rowen, 2022). This approach would allow for a better understanding of personal barriers, drivers, and needs, thereby facilitating the creation of tailored services and enhancing the integration of deepfake therapy into practice (Bovaird, 2007).

Strengths and Limitations

This study contained limitations which warrants attention in future research. The anticipated desired sample size was only reached for the bereaved people. As for the clinicians, it can be questioned whether the statistically significant results reflected true effects, since low statistical power can lead to overestimates of effect size and low reproducibility of results (Button et al., 2013). Moreover, as the present study included a homogeneous clinicians sample, considering that they were all trained at a higher professional education or university level and working in the Dutch mental healthcare system, conclusions could not be drawn about clinicians from other countries and/or cultures. Future research should include larger and more diverse samples to further explore the potential of deepfake technology. A larger sample size would also facilitate statistical comparative analyses of the opinions of bereaved individuals and clinicians, addressing another limitation of the current study. Similarly, the sample of bereaved people was predominantly composed of women, potentially biassing the outcomes and their generalisability, as (higher educated) women have been shown to have increased help-seeking tendencies as well as higher intentions to use innovative treatments (Apolinário-Hagen et al., 2017; Arjadi et al., 2018; Oliver et al., 2005).

Additionally, drop-out rates might have been affected by showing the brief video clip of the documentary on deepfake therapy, because several bereaved people withdrew from the study immediately after viewing the video clip. This suggests that the results may have been biassed, since possibly fewer negative stances were included in the final outcomes.

Regarding the strengths, this study implemented validated instruments assessing essential determinants of technology adoption and the subsequent intention to use. A thorough literature search was conducted contributing to the ability to measure potential factors affecting the intention to use deepfake technology. Another notable strength is that the present study included both a sample of bereaved people and clinicians. Hence, insights have been obtained from two of the most crucial parties involved in the potential uptake of deepfake therapy for PGD patients. This approach, therefore, led to a holistic view, ensuring that both their needs as treatment receiver and provider were addressed, enriching the process of potentially implementing deepfake technology in grief treatment.

Practical Implications and Future Recommendations

To the best of available knowledge, this exploratory survey study has been the first to investigate factors related to the intention to use deepfake technology in grief treatment amongst bereaved people and clinicians. As 25.00% of the bereaved people and 45.06% of the clinicians intended to use deepfake technology in grief treatment, increasing the willingness to use the technology seems important. Lowering the threshold around deepfake's uptake may especially be reached by increasing the performance expectancy amongst bereaved people and clinicians their acceptability of deepfake technology. Increasing performance expectancy, i.e., bereaved people's view on the expected health benefits, may be achieved by informing them on its usefulness, expectations of participation, and using testimonials (Gulliver et al., 2020). Brief informative videos were found to successfully increase the acceptability of Internet-based interventions amongst patients with depressive symptoms (Ebert et al., 2015).

Providing psychoeducational information to clinicians, particularly through expert-evaluated text-based materials, can increase the acceptability, positive attitudes, and willingness to use deepfake technology in grief treatment (Apolinário-Hagen et al., 2018; Casey et al., 2013). Leveraging respected opinion leaders within the clinical field to disseminate information, alongside developing user-friendly resources and education courses that translate complex research findings into practical information (Lilienfeld et al., 2013), is crucial for supporting clinicians in adopting deepfake technology in their practice.

Delivering information to bereaved people and clinicians on deepfake's effectiveness asks for future research assessing the long-term positive and negative effects of deepfake technology on (the symptom levels of) PGD patients. Studies should examine whether deepfake technology can serve as a realistic form of exposure in CBT in line with Virtual Reality's ability to effectively deliver exposure to patients (Botella et al., 2008; Quero et al., 2018). Furthermore, its potential to add to or even replace the empty-chair method, writing a letter to the deceased, or (imaginary) rescripting techniques in terms of traumatic experiences or memories associated with the death of the loved one, could be investigated (Gagliardi & Markowski, 2024; Zhu, 2022). This can then guide the ethical and practical design and considerate implementation of a treatment protocol.

Conclusion

While research determining the effectiveness of deepfake technology in grief treatment is crucial, and evidence-based guidelines are imperative to ensure safe and ethical adoption, the perceptions obtained in this study offer a first step in exploring the potential of deepfake technology as a supplemental tool for treating PGD patients. By aligning with bereaved people and clinicians their evolving needs and keeping pace with technological advances, this research contributes to the ongoing optimisation of grief treatments for PGD patients.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Alzahrani, S. (2021). Assessing the readiness of using virtual reality in mental health practice in Australia. *AIS Electronic Library (AISeL)*, *84*, 1–12. https://aisel.aisnet.org/acis2021/84

American Psychiatric Association. (2022). *Diagnostic and Statistical Manual of Mental Disorders,* Fifth Edition, Text Revision (DSM-5-TR). American Psychiatric Association Publishing. https://www.psychiatry.org/psychiatrists/practice/dsm

Apolinário-Hagen, J., Fritsche, L., Bierhals, C., & Salewski, C. (2018). Improving attitudes toward e-mental health services in the general population via psychoeducational information material: A randomized controlled trial. *Internet Interventions*, *12*, 141–149. https://doi.org/10.1016/j.invent.2017.12.002

Apolinário-Hagen, J., Kemper, J., & Stürmer, C. (2017). Public Acceptability of E-Mental Health Treatment Services for Psychological Problems: A Scoping review. *JMIR Mental Health*, *4*(2), e10. https://doi.org/10.2196/mental.6186

Arjadi, R., Nauta, M. H., & Bockting, C. L. (2018). Acceptability of internet-based interventions for depression in Indonesia. *Internet Interventions*, *13*, 8–15. https://doi.org/10.1016/j.invent.2018.04.004

Botella, C., Osma, J., García-Palacios, A., Guillén, V., & Baños, R. (2008). Treatment of complicated grief using virtual reality: A case report. *Death Studies*, *32*(7), 674–692. https://doi.org/10.1080/07481180802231319

Bovaird, T. (2007). Beyond engagement and participation: user and community coproduction of public services. *PAR. Public Administration Review/Public Administration Review*, *67*(5), 846–860. https://doi.org/10.1111/j.1540-6210.2007.00773.x

Braun, P., Drüge, M., Hennemann, S., Nitsch, F. J., Staeck, R., & Apolinário-Hagen, J. (2022). Acceptance of E-Mental health services for different application purposes among psychotherapists in clinical training in Germany and Switzerland: Secondary analysis of a Cross-Sectional survey. *Frontiers in Digital Health*, *4*. https://doi.org/10.3389/fdgth.2022.840869

Bryant, R. A., Kenny, L., Joscelyne, A., Rawson, N., Maccallum, F., Cahill, C., & Hopwood, S. (2017). Predictors of treatment response for cognitive behaviour therapy for prolonged grief disorder. *European Journal of Psychotraumatology*, *8*. https://doi.org/10.1080/20008198.2018.1556551

Bryant, R. A., Kenny, L., Joscelyne, A., Rawson, N., Maccallum, F., Cahill, C., Hopwood, S., Aderka, I. M., & Nickerson, A. (2014). Treating prolonged grief disorder. *JAMA Psychiatry*, *71*(12), 1332. https://doi.org/10.1001/jamapsychiatry.2014.1600

Button, K. S., Ioannidis, J. P. A., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S. J., & Munafò, M. R. (2013). Power failure: why small sample size undermines the reliability of neuroscience. *Nature Reviews. Neuroscience*, *14*(5), 365–376. https://doi.org/10.1038/nrn3475

Cacciatore, J., Thieleman, K., Fretts, R., & Jackson, L. B. (2021). What is good grief support? Exploring the actors and actions in social support after traumatic grief. *PloS One*, *16*(5), e0252324. https://doi.org/10.1371/journal.pone.0252324

Casey, L. M., Joy, A., & Clough, B. A. (2013). The impact of information on attitudes toward E-Mental health Services. *Cyberpsychology, Behavior and Social Networking*, *16*(8), 593–598. https://doi.org/10.1089/cyber.2012.0515

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly*, *13*(3), 319. https://doi.org/10.2307/249008

Deepfake Therapy: praten met overleden dierbaren. (2020, October 9). NPO Radio 1. https://www.nporadio1.nl/fragmenten/nos-met-het-oog-op-morgen/17182479-ac94-4980-9a22-59195b6195e4/2020-10-09-deepfake-therapy-praten-met-overleden-dierbaren

Ebert, D. D., Berking, M., Cuijpers, P., Lehr, D., Portner, M. D., & Baumeister, H. (2015). Increasing the acceptance of internet-based mental health interventions in primary care patients with depressive symptoms. A randomized controlled trial. *Journal of Affective Disorders*, *176*, 9–17. https://doi.org/10.1016/j.jad.2015.01.056

Eisma, M. C., Boelen, P. A., & Lenferink, L. I. (2020). Prolonged grief disorder following the Coronavirus (COVID-19) pandemic. *Psychiatry Research*, *288*, 113031. https://doi.org/10.1016/j.psychres.2020.113031

Etemad-Sajadi, R., Soussan, A., & Schöpfer, T. (2022). How Ethical Issues Raised by Human–Robot Interaction can Impact the Intention to use the Robot? *International Journal of Social Robotics*, *14*(4), 1103–1115. https://doi.org/10.1007/s12369-021-00857-8

European Parliament Research Services (2021). *Tackling deepfakes in European policy*, European Parliament. https://data.europa.eu/doi/10.2861/325063

Feijt, M., De Kort, Y., Westerink, J., Bierbooms, J., Bongers, I., & IJsselsteijn, W. (2021). Assessing Professionals' adoption readiness for eMental Health: Development and validation of the eMental Health Adoption Readiness Scale. *Journal of Medical Internet Research*, *23*(9), e28518. https://doi.org/10.2196/28518

Feijt, M., De Kort, Y., Westerink, J., Bierbooms, J., Bongers, I., & IJsselsteijn, W. (2023). Integrating technology in mental healthcare practice: A repeated cross-sectional survey study on professionals' adoption of Digital Mental Health before and during COVID-19. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.1040023

Feijt, M. A., De Kort, Y. A., Bongers, I. M., & IJsselsteijn, W. A. (2018). Perceived Drivers and Barriers to the adoption of eMental Health by Psychologists: The construction of the levels of adoption of eMental Health Model. *JMIR. Journal of Medical Internet Research/Journal of Medical Internet Research*, *20*(4), e153. https://doi.org/10.2196/jmir.9485

Field, A., Field, Z., & Miles, J. (2012). *Discovering statistics using SPSS*. SAGE Publications Ltd.

Gagliardi, M., & Markowski, M. (2024). Active Imagery Rescripting in Virtual Reality as a Promising Tool to Address Psychological Conditions. *Computers in Human Behavior Reports*, *15*, 1–13. https://doi.org/10.1016/j.chbr.2024.100440.

Gulliver, A., Calear, A. L., Sunderland, M., Kay-Lambkin, F., Farrer, L. M., Banfield, M., & Batterham, P. J. (2020). Consumer-Guided development of an Engagement-Facilitation Intervention for increasing uptake and adherence for Self-Guided Web-Based mental health Programs: focus groups and Online Evaluation survey. *JMIR Formative Research*, *4*(10), e22528. https://doi.org/10.2196/22528

Hancock, J. T., & Bailenson, J. N. (2021). The social impact of Deepfakes. *Cyberpsychology, Behavior, and Social Networking*, *24*(3), 149–152. https://doi.org/10.1089/cyber.2021.29208.jth

Jordan, A. H., & Litz, B. T. (2014). Prolonged grief disorder: Diagnostic, assessment, and treatment considerations. *Professional Psychology, Research and Practice*, *45*(3), 180–187. https://doi.org/10.1037/a0036836

Kaltenthaler, E., Sutcliffe, P., Parry, G., Beverley, C., Rees, A., & Ferriter, M. (2008). The acceptability to patients of computerized cognitive behaviour therapy for depression: a systematic review. *Psychological Medicine*, *38*(11), 1521–1530. https://doi.org/10.1017/s0033291707002607

Komischke-Konnerup, K. B., Zachariae, R., Boelen, P. A., Marello, M. M., & O'Connor, M. (2024). Grief-focused cognitive behavioral therapies for prolonged grief symptoms: A systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology*, *92*(4), 236–248. https://doi.org/10.1037/ccp0000884

Lenferink, L., De Keijser, J., Eisma, M. C., Smid, G. E., & Boelen, P. A. (2021). Treatment gap in bereavement care: (Online) bereavement support needs and use after traumatic loss. *Clinical Psychology & Psychotherapy*, *28*(4), 907–916. https://doi.org/10.1002/cpp.2544

Lenferink, L., Eisma, M. C., Buiter, M., De Keijser, J., & Boelen, P. A. (2023). Online cognitive behavioral therapy for prolonged grief after traumatic loss: a randomized waitlist-controlled trial. *Cognitive Behaviour Therapy*, *52*(5), 508–522. https://doi.org/10.1080/16506073.2023.2225744

Lenferink, L., Eisma, M. C., Smid, G. E., De Keijser, J., & Boelen, P. A. (2022). Valid measurement of DSM-5 persistent complex bereavement disorder and DSM-5-TR and ICD-11 prolonged grief disorder: The Traumatic Grief Inventory-Self Report Plus (TGI-SR+). *Comprehensive Psychiatry*, *112*, 152281. https://doi.org/10.1016/j.comppsych.2021.152281

Li, L., Peng, W., & Rheu, M. M. (2024). Factors predicting intentions of adoption and continued use of artificial intelligence chatbots for mental health: Examining the role of UTAUT model, stigma, privacy concerns, and artificial intelligence hesitancy. *Telemedicine and E-health*, *30*(3), 722–730. https://doi.org/10.1089/tmj.2023.0313

Lilienfeld, S. O., Ritschel, L. A., Lynn, S. J., Cautin, R. L., & Latzman, R. D. (2013). Why many clinical psychologists are resistant to evidence-based practice: Root causes and constructive remedies. *Clinical Psychology Review*, *33*(7), 883–900. https://doi.org/10.1016/j.cpr.2012.09.008

Lundorff, M., Holmgren, H., Zachariae, R., Farver-Vestergaard, I., & O'Connor, M. (2017). Prevalence of prolonged grief disorder in adult bereavement: A systematic review and meta-analysis. *Journal of Affective Disorders*, *212*, 138–149. https://doi.org/10.1016/j.jad.2017.01.030

Magotra, I., Sharma, J., & Sharma, S. K. (2016). Assessing personal disposition of individuals towards technology adoption. *Future Business Journal*, *2*(1), 81–101. https://doi.org/10.1016/j.fbj.2016.05.003

Mitchell, K. M., Holtz, B. E., & McCarroll, A. M. (2022). Assessing college students' perceptions of and intentions to use a mobile app for mental health. *Telemedicine and E-health*, *28*(4), 566–574. https://doi.org/10.1089/tmj.2021.0106

Munnichs, K. (2020, October 25). *2Doc Kort: Deepfake Therapy*. 2Doc.nl. https://www.2doc.nl/documentaires/2020/10/deepfake-therapy.html

Oliver, M. I., Pearson, N., Coe, N., & Gunnell, D. (2005). Help-seeking behaviour in men and women with common mental health problems: cross-sectional study. *British Journal of Psychiatry*, *186*(4), 297–301. https://doi.org/10.1192/bjp.186.4.297

Pizzoli, S. F. M., Monzani, D., Vergani, L., Sanchini, V., & Mazzocco, K. (2021). From virtual to real healing: a critical overview of the therapeutic use of virtual reality to cope with mourning. *Current Psychology*, *42*(11), 8697–8704. https://doi.org/10.1007/s12144-021-02158-9

Powell, P. A., & Rowen, D. (2022). What Matters for Evaluating the Quality of Mental Healthcare? Identifying Important Aspects in Qualitative Focus Groups with Service Users and Frontline Mental Health Professionals. *Patient*, *15*(6), 669–678. https://doi.org/10.1007/s40271-022-00580-0

Proctor, E. K., Silmere, H., Raghavan, R., Hovmand, P. S., Aarons, G., Bunger, A. C., Griffey, R. T., & Hensley, M. (2010). Outcomes for Implementation research:

conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*(2), 65–76. https://doi.org/10.1007/s10488-010-0319-7

Quero, S., Molés, M., Campos, D., Andreu-Mateu, S., Baños, R., & Botella, C. (2018). An adaptive virtual reality system for the treatment of adjustment disorder and complicated grief: 1-year follow-up efficacy data. *Clinical Psychology & Psychotherapy*, *26*(2), 204–217. https://doi.org/10.1002/cpp.2342

Rai, A., Chen, L., Pye, J., & Baird, A. (2013). Understanding determinants of consumer mobile health usage intentions, assimilation, and channel preferences. *Journal of Medical Internet Research*, *15*(8), e149. https://doi.org/10.2196/jmir.2635

Rando, T. A. (1993). *Treatment of complicated mourning.* Research Press.

Rentrop, V., Damerau, M., Schweda, A., Steinbach, J., Schüren, L. C., Niedergethmann, M., Skoda, E., Teufel, M., & Bäuerle, A. (2022). Predicting acceptance of e–Mental health interventions in patients with obesity by using an extended unified theory of acceptance model: cross-sectional study. *JMIR Formative Research*, *6*(3), e31229. https://doi.org/10.2196/31229

Sars, D., & van Minnen, A. (2012). Het gebruik van exposure bij de behandeling van angststoornissen in Nederland: een onderzoek onder cognitieve gedragstherapeuten. *Tijdschrift voor Gedragstherapie*, *45*. https://www.researchgate.net/publication/316792954_Het_gebruik_van_exposure_bij_de_behandeling_van_angststoornissen_in_nederland_een_onderzoek_onder_cognitieve_gedragstherapeuten

Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information & Management*, *44*(1), 90–103. https://doi.org/10.1016/j.im.2006.10.007

Segal, R., Bhatia, M., & Drapeau, M. (2011). Therapists' perception of benefits and costs of using virtual reality treatments. *Cyberpsychology, Behavior and Social Networking*, *14*(1–2), 29–34. https://doi.org/10.1089/cyber.2009.0398

Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, *8*(2), 39–42. https://doi.org/10.12691/ajams-8-2-1

Son, J. (2018). Back translation as a documentation tool. *Translation & Interpreting*, *10*(2), 89–100. https://doi.org/10.12807/ti.110202.2018.a07

Staeck, R., Stüble, M., & Drüge, M. (2024). Exploring subgroups of acceptance prediction for e-mental health among psychotherapists-in-training: a latent class analysis. *Frontiers in Psychiatry*, *15*. https://doi.org/10.3389/fpsyt.2024.1296449

Szuhany, K. L., Malgaroli, M., Miron, C. D., & Simon, N. M. (2021). Prolonged Grief Disorder: Course, diagnosis, assessment, and treatment. *Focus*, *19*(2), 161–172. https://doi.org/10.1176/appi.focus.20200052

Taherdoost, H. (2016). Validity and reliability of the research instrument; How to test the validation of a Questionnaire/Survey in a research. *Social Science Research Network*. https://doi.org/10.2139/ssrn.3205040

Tavakol, M., & Wetzel, A. P. (2020). Factor Analysis: a means for theory and instrument development in support of construct validity. *International Journal of Medical Education*, *11*, 245–247. https://doi.org/10.5116/ijme.5f96.0f4a

Van Der Vaart, R., Atema, V., & Evers, A. W. M. (2016). Guided online self-management interventions in primary care: a survey on use, facilitators, and barriers. *BMC Family Practice*, *17*(1). https://doi.org/10.1186/s12875-016-0424-0

Van Minnen, A., Ter Heide, F. J. J., Koolstra, T., De Jongh, A., Karaoğlu, S., & Gevers, T. (2022). Initial development of perpetrator confrontation using deepfake technology in

victims with sexual violence-related PTSD and moral injury. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.882957

Venkatesh, N., Morris, N., Davis, N., & Davis, N. (2003). User acceptance of information Technology: toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425. https://doi.org/10.2307/30036540

Verhagen, L. (2022, December 22). Deepfaketherapie: kan praten met dader of overleden partner helpen iets te verwerken? *De Volkskrant*. https://www.volkskrant.nl/wetenschap/deepfaketherapie-kan-praten-met-dader-of-overleden-partner-helpen-iets-te-verwerken~b66aea2a/?referrer=https://www.google.com/

Vis, C., Mol, M., Kleiboer, A., Bührmann, L., Finch, T., Smit, J., & Riper, H. (2018). Improving implementation of eMental Health for mood disorders in routine practice: systematic review of barriers and facilitating factors. *JMIR Mental Health*, *5*(1), e20. https://doi.org/10.2196/mental.9769

Wallace, C. L., Wladkowski, S. P., Gibson, A., & White, P. (2020). Grief during the COVID-19 Pandemic: Considerations for palliative care providers. *Journal of Pain and Symptom Management*, *60*(1), e70–e76. https://doi.org/10.1016/j.jpainsymman.2020.04.012

Weiner, B. J., Lewis, C. C., Stanick, C., Powell, B. J., Dorsey, C. N., Clary, A., Boynton, M. H., & Halko, H. M. (2017). Psychometric assessment of three newly developed implementation outcome measures. *Implementation Science*, *12*(1). https://doi.org/10.1186/s13012-017-0635-3

Westerlund, M. (2019). The Emergence of Deepfake Technology: A review. *Technology Innovation Management Review*, *9*(11), 39–52. https://doi.org/10.22215/timreview/1282

Wohlgenannt, I., Simons, A., & Stieglitz, S. (2020). Virtual reality. *Business & Information Systems Engineering*, *62*(5), 455–461. https://doi.org/10.1007/s12599-020-00658-9

Yu, P., Xia, Z., Fei, J., & Lu, Y. (2021). A survey on deepfake video detection. *IET Biometrics*, *10*(6), 607–624. https://doi.org/10.1049/bme2.12031

Appendix A

Written Explanation About Deepfake Technology in Dutch

Deepfake-Technologie in Rouwbehandeling

Deepfake-technologie in rouwbehandeling U gaat nu eerst een kort fragment van een documentaire bekijken. Deze documentaire is uitgebracht in 2020 en laat een experiment zien waarbij nabestaanden via deepfake-technologie een interactief videogesprek met hun overleden dierbaren voeren. Bij deepfake-technologie in rouwbehandeling wordt een computer gebruikt om realistische, maar neppevideo's te maken van de overledene. Zo wordt een bestaande foto of kort filmpje van de overledene gemanipuleerd door deepfake-technologie, waardoor het hoofd, de mond en ogen lichtelijk zullen bewegen. Zo wordt in de documentaire de gemanipuleerde beelden van een overledene gesynchroniseerd met de mond van een stemacteur. Deze stemacteur speelt de rol van de overledene. In de video zijn onder andere Ron en Patricia te zien die weer in contact worden gebracht met hun overleden dochter.

Deepfake-technologie zou kunnen dienen als middel om de bestaande technieken van rouwbehandeling te ondersteunen. In rouwbehandeling wordt bijvoorbeeld soms gebruik gemaakt van het schrijven van een brief aan de overledene. Naast het schrijven van een brief, zou deepfake-technologie ingezet kunnen worden om de brief bijvoorbeeld voor te lezen aan de overledene in de video. Rouwbehandeling is gericht op mensen die na het verlies hevige en aanhoudende rouwklachten ervaren. Deze mensen ervaren belemmeringen in het dagelijkse leven en zoeken daarom professionele psychologische hulp.

Appendix B

Written Explanation About Deepfake Technology in English

Deepfake Technology in Grief Treatment

You will now watch a short excerpt from a documentary. This documentary was released in 2020 and depicts an experiment where bereaved people engage in an interactive video conversation with their deceased loved ones through deepfake technology. In grief treatment involving deepfake technology, a computer is used to create realistic but fake videos of the deceased. For example, an existing photo or short video clip of the deceased is manipulated using deepfake technology, causing slight movements in the head, mouth, and eyes. In the documentary, the manipulated images of a deceased individual are synchronised with the mouth of a voice actor who portrays the deceased. The video features individuals, like Ron and Patricia, who are reconnected with their deceased daughter.

Deepfake technology could serve as a means to support existing grief treatment techniques. For instance, grief treatment sometimes involves writing a letter to the deceased. In addition to writing a letter, deepfake technology could be used to, for example, read the letter aloud to the deceased in the video. Grief treatment is aimed at individuals who experience intense and persistent grief symptoms after a loss. These individuals face obstacles in their daily lives and therefore seek professional psychological assistance.

Appendix C

Traumatic Grief Inventory-Self Report Plus (TGI-SR+)

Below several grief reactions are listed. Please indicate how often you have experienced each reaction in the past month in response to the death of your loved one.

		never	rarely	sometimes	frequently	always
1	I had intrusive thoughts or images related to the person who died	☐	☐	☐	☐	☐
2	I experienced intense emotional pain, sadness, or pangs of grief	☐	☐	☐	☐	☐
3	I found myself longing or yearning for the person who died	☐	☐	☐	☐	☐
4	I experienced confusion about my role in life or a diminished sense of self	☐	☐	☐	☐	☐
5	I had trouble accepting the loss	☐	☐	☐	☐	☐
6	I avoided places, objects, or thoughts that reminded me that the person I lost has died	☐	☐	☐	☐	☐
7	It was hard for me to trust others	☐	☐	☐	☐	☐
8	I felt bitterness or anger related to his/her death	☐	☐	☐	☐	☐
9	I felt that that moving on (e.g., making new friends, pursuing new interests) was difficult for me	☐	☐	☐	☐	☐
10	I felt emotionally numb	☐	☐	☐	☐	☐
11	I felt that life is unfulfilling or meaningless without him/her.	☐	☐	☐	☐	☐
12	I felt stunned, shocked, or dazed by his/her death.	☐	☐	☐	☐	☐
13	I noticed significant reduction in social, occupational, or other important areas of functioning (e.g., domestic responsibilities) as a result of his/her death	☐	☐	☐	☐	☐
14	I had intrusive thoughts and images associated with the circumstances of his/her death	☐	☐	☐	☐	☐
15	I experienced difficulty with positive reminiscing about the lost person	☐	☐	☐	☐	☐
16	I had negative thoughts about myself in relation to the loss (e.g., thoughts about self-blame)	☐	☐	☐	☐	☐
17	I had a desire to die in order to be with the deceased	☐	☐	☐	☐	☐
18	I felt alone or detached from other individuals.	☐	☐	☐	☐	☐
19	It felt unreal that he/she is dead	☐	☐	☐	☐	☐
20	I put an intense blame on others because of his/her death	☐	☐	☐	☐	☐
21	It felt as if a part of me has died along with the deceased	☐	☐	☐	☐	☐
22	I had difficulties experiencing positive feelings	☐	☐	☐	☐	☐

Appendix D

Questionnaire Items Bereaved People

Table 1

Overview Questionnaire Items Bereaved People

TPB factor	Scale	Item
Intention	Intention to use deepfake technology in grief treatment	1. If I would have access to deepfake technology in grief treatment, I would use it.
Intention	Intention to use deepfake technology in grief treatment	2. If I would have access to deepfake technology in grief treatment, I would prefer to use it instead of grief treatment without deepfake technology.
Intention	Intention to use deepfake technology in grief treatment	3. Overall, I am impressed by deepfake technology in grief treatment.
Intention	Intention to use deepfake technology in grief treatment	4. I would recommend to the people surrounding me to use deepfake technology in grief treatment.
Attitude	Acceptability	1. Deepfake technology in grief treatment meets my approval.
Attitude	Acceptability	2. Deepfake technology in grief treatment is appealing to me.
Attitude	Acceptability	3. I like deepfake technology in grief treatment.
Attitude	Acceptability	4. I welcome deepfake technology in grief treatment.
Attitude	Appropriateness	1. Deepfake technology in grief treatment seems appropriate.
Attitude	Appropriateness	2. Deepfake technology in grief treatment seems suitable.
Attitude	Appropriateness	3. Deepfake technology in grief treatment seems applicable.
Attitude	Appropriateness	4. Deepfake technology in grief treatment seems like a good match.
Attitude	Openness towards use innovative technologies*	1. In het algemeen wanneer ik iets hoor over een nieuwe online dienst, zoek ik naar manieren om hiermee te experimenteren.
Attitude	Openness towards use innovative technologies	2. Onder mijn vrienden en familie ben ik meestal de eerste die nieuwe online diensten uitprobeert.
Attitude	Openness towards use innovative technologies	3. Ik vind het leuk om te experimenteren met nieuwe online diensten.
Attitude	Concerns regarding data security	1. When I would participate in a deepfake-session in grief treatment, I would trust that all information I share would be treated in strict confidence (for instance information about the deceased, like their name and cause of death).

Attitude	Concerns regarding data security	2. When I think about participating in a deep-fake session, I fear that confidential information might fall into the wrong hands.
Attitude	Privacy and data protection	1. I should be informed of how deepfake technology in grief treatment will use information about me.
Attitude	Privacy and data protection	2. I don't mind sharing personal information to create a deepfake of my loved one in the context of grief treatment (for instance information about the deceased, such as name and cause of death).
Attitude	Responsibility	1. I think the law, and subsequent punishment, should apply to deepfake technology in a grief treatment context.
Attitude	Responsibility	2. The company that is responsible for creating the deepfake technology is responsible for its use in grief treatment when a deceased person is inaccurately portrayed or when incorrect information is provided when using the deepfake technology in grief treatment.
Attitude	Trust and safety	1. I perceive deepfake technology as safe in grief treatment.
Attitude	Trust and safety	2. I think that deepfake technology in grief treatment is vulnerable to hackers.
Attitude	Trust and safety	3. I would hesitate to use deepfake technology in grief treatment out of fear to make mistakes that could harm me.
Attitude	Knowledge about deepfake technology in grief treatment	1. I have a clear picture of what I can expect during a deepfake-session in grief treatment for coping with loss.
Attitude	Knowledge about deepfake technology in grief treatment	2. I already had some knowledge about deepfake technology in grief treatment before participating in this research.
Attitude	Negative psychological consequences*	1. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling de herinneringen aan de overledene negatief beïnvloedt.
Attitude	Negative psychological consequences*	2. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling een slechte invloed heeft op het rouwproces.
Attitude	Negative psychological consequences*	3. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling niet helpend is om beter om te gaan met het verlies van een dierbare.
Attitude	Negative psychological consequences*	4. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling zo echt kan aanvoelen dat mensen moeite hebben om te stoppen met het gebruik van deepfake-technologie.
Attitude	Negative psychological consequences*	5. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling zo echt kan aanvoelen dat mensen geloven dat zij echt met de overeldene kunnen spreken.
Attitude	Negative psychological consequences*	6. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling zo echt kan aanvoelen dat mensen gebruik willen blijven maken van deepfake-technologie om zo in contact te blijven met de overledene.

Subjective norm	Social influence	1. People close to me would recommend me to use deepfake technology in grief treatment to help me cope with the loss of my loved one.
Subjective norm	Social influence	2. My general practitioner would recommend me to use deepfake technology in grief treatment.
Subjective norm	Social influence	3. People close to me would use deepfake technology in grief treatment in case they would suffer after losing a loved one.
Subjective norm	Social influence	4. Others would think badly about me if I would use deepfake technology in grief treatment for coping with the loss of my loved one.
Perceived behavioural control	Feasibility	1. Deepfake technology in grief treatment seems implementable.
Perceived behavioural control	Feasibility	2. Deepfake technology in grief treatment seems possible.
Perceived behavioural control	Feasibility	3. Deepfake technology in grief treatment seems feasible.
Perceived behavioural control	Feasibility	4. Deepfake technology in grief treatment seems easy to use.
Perceived behavioural control	Performance expectancy	1. Using deepfake technology in grief treatment would reduce my grief complaints.
Perceived behavioural control	Performance expectancy	2. Using deepfake technology in grief treatment for grief complaints would improve my personal well-being.
Perceived behavioural control	Performance expectancy	3. I would get support for grief complaints in grief treatment using deepfake technology.
Perceived behavioural control	Performance expectancy	4. Using deepfake technology in grief treatment would help me to cope with the loss of my loved one.
Perceived behavioural control	Effort expectancy	1. Using deepfake technology in grief treatment to cope with the loss of my loved one would cost me a lot of time and energy.
Perceived behavioural control	Effort expectancy	2. Using deepfake technology in grief treatment would be an easy task for me.
Perceived behavioural control	Effort expectancy	3. Deepfake technology in grief treatment would be clear and easy to understand for me.

Note. * These items were already written in Dutch.

Appendix E

Questionnaire Items Clinicians

Table 1

Overview Questionnaire Items Clinicians

TPB factor	Scale	Item
Intention	Intention to use deepfake technology in grief treatment	1. If I would have access to deepfake technology in grief treatment, I would use it.
Intention	Intention to use deepfake technology in grief treatment	2. If I would have access to deepfake technology in grief treatment, I would prefer to use it instead of grief treatment without deepfake technology.
Intention	Intention to use deepfake technology in grief treatment	3. Overall, I am impressed by deepfake technology in grief treatment.
Intention	Intention to use deepfake technology in grief treatment	4. I would recommend other psychologists to work with deepfake technology in grief treatment.
Attitude	Acceptability	1. Deepfake technology in grief treatment meets my approval.
Attitude	Acceptability	2. Deepfake technology in grief treatment is appealing to me.
Attitude	Acceptability	3. I like deepfake technology in grief treatment.
Attitude	Acceptability	4. I welcome deepfake technology in grief treatment.
Attitude	Appropriateness	1. Deepfake technology in grief treatment seems appropriate.
Attitude	Appropriateness	2. Deepfake technology in grief treatment seems suitable.
Attitude	Appropriateness	3. Deepfake technology in grief treatment seems applicable.
Attitude	Appropriateness	4. Deepfake technology in grief treatment seems like a good match.
Attitude	Openness towards use innovative technologies*	1. In het algemeen wanneer ik iets hoor over een nieuwe online dienst, zoek ik naar manieren om hiermee te experimenteren.
Attitude	Openness towards use innovative technologies	2. Onder mijn vrienden en familie ben ik meestal de eerste die nieuwe online diensten uitprobeert.
Attitude	Openness towards use innovative technologies	3. Ik vind het leuk om te experimenteren met nieuwe online diensten.
Attitude	Concerns regarding data security	1. During a deepfake session, I would trust that all information shared by the patients would be treated in strict confidence (for example information about the deceased, like their name and cause of death).

Attitude	Concerns regarding data security	2. When I think about having a deepfake session, I fear that confidential information might fall into the wrong hands.
Attitude	Privacy and data protection	1. I think patients should be informed of how deepfake technology in grief treatment will use information about them.
Attitude	Privacy and data protection	2. I think patients don't mind giving personal information to create a deepfake of their loved ones in a grief treatment delivery context (for example information about the deceased, like their name and cause of death).
Attitude	Responsibility	1. I think the law, and subsequent punishment, should apply to deepfake technology in a grief treatment context.
Attitude	Responsibility	2. The company that is responsible for creating the deepfake technology is responsible for its use in grief treatment when a deceased person is inaccurately portrayed or when incorrect information is provided when using the deepfake technology in grief treatment.
Attitude	Trust and safety	1. I perceive deepfake technology as safe in grief treatment.
Attitude	Trust and safety	2. I think that deepfake technology in grief treatment is vulnerable to hackers.
Attitude	Trust and safety	3. I would hesitate to use deepfake technology in grief treatment out of fear of making mistakes that could harm my patients.
Attitude	Knowledge about deepfake technology in grief treatment	1. I have a clear picture of what I can expect during a deepfake session in grief treatment for coping with a patient's loss.
Attitude	Knowledge about deepfake technology in grief treatment	2. I already had some knowledge about deepfake technology in grief treatment before participating in this research.
Attitude	Perceived benefits*	1. Deepfake-technologie in rouwbehandeling sluit goed aan bij mijn werk als psycholoog.
Attitude	Perceived benefits*	2. Rouwbehandeling hoort altijd zonder gebruik van deepfake-technologie te zijn.
Attitude	Perceived benefits*	3. Ik verwacht dat deepfake-technologie voordelen biedt voor de zorg die ik verleen.
Attitude	Perceived benefits*	4. Deepfake-technologie biedt geen verbetering aan de zorg die ik verleen.
Attitude	Perceived benefits*	5. Deepfake-technologie past niet bij het beroep van psycholoog.
Attitude	Perceived benefits*	6. Deepfake-technologie heeft geen toegevoegde waarde voor mijn werk als psycholoog.
Attitude	Perceived benefits*	7. Deepfake-technologie is een onmisbaar onderdeel van het werk van een psycholoog.
Attitude	Negative psychological consequences*	1. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling de herinneringen aan de overledene negatief beïnvloedt.
Attitude	Negative psychological consequences*	2. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling een slechte invloed heeft op het rouwproces.
Attitude	Negative psychological consequences*	3. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling niet helpend is om beter om te gaan met het verlies van een dierbare.

Attitude	Negative psychological consequences*	4. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling zo echt kan aanvoelen dat mensen moeite hebben om te stoppen met het gebruik van deepfake-technologie.
Attitude	Negative psychological consequences*	5. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling zo echt kan aanvoelen dat mensen geloven dat zij echt met de overledene kunnen spreken.
Attitude	Negative psychological consequences*	6. Ik denk dat het gebruik van deepfake-technologie in rouwbehandeling zo echt kan aanvoelen dat mensen gebruik willen blijven maken van deepfake-technologie om zo in contact te blijven met de overledene.
Subjective norm	Social influence	1. I expect psychologists to lack confidence in using deepfake technology in grief treatment.
Subjective norm	Social influence	2. I expect psychologists likely to fear that deepfake technology in grief treatment might cause harm to patients.
Subjective norm	Social influence	3. I expect psychologists to be anxious of using deepfake technology in grief treatment.
Subjective norm	Facilitating conditions	1. I think my company is unlikely to provide financial support for the implementation of deepfake technology in grief treatment.
Subjective norm	Facilitating conditions	2. I think it will be difficult to obtain resources/equipment in my workplace to support using deepfake in grief treatment (for example, finding deepfake developers or deepfake therapy platforms to design suitable deepfakes).
Subjective norm	Facilitating conditions	3. I think integrating deepfake technology into my workplace will be easy.
Subjective norm	Facilitating conditions	4. I would be reluctant to use deepfake technology in grief treatment without guidelines and approved standards.
Perceived behavioural control	Feasibility	1. Deepfake technology in grief treatment seems implementable.
Perceived behavioural control	Feasibility	2. Deepfake technology in grief treatment seems possible.
Perceived behavioural control	Feasibility	3. Deepfake technology in grief treatment seems feasible.
Perceived behavioural control	Feasibility	4. Deepfake technology in grief treatment seems easy to use.
Perceived behavioural control	Self-efficacy*	1. Ik bezit vaardigheden die nodig zijn om deepfake-technologie toe te passen in mijn werk.
Perceived behavioural control	Self-efficacy*	2. Ik verwacht dat het gebruiken van deepfake-technologie mij gemakkelijk af zal gaan.
Perceived behavioural control	Self-efficacy*	3. Om deepfake-technologie te gaan gebruiken moet ik nieuwe vaardigheden leren.
Perceived behavioural control	Performance expectancy	1. Using deepfake technology in grief treatment would be a viable alternative to grief treatment without deepfake technology.
Perceived behavioural control	Performance expectancy	2. Using deepfake technology would be a cost-effective tool to use in grief treatment.
Perceived behavioural control	Performance expectancy	3. Using deepfake technology will improve the quality of grief treatment.
Perceived behavioural control	Performance expectancy	4. Using deepfake technology in grief treatment could be harmful to my patients.

Perceived behavioural control	Performance expectancy	5. I think patients are unlikely to understand why using deepfake technology in grief treatment could be useful.
Perceived behavioural control	Performance expectancy	6. I think patients might use deepfake technology as self-help without the need to consult a psychologist.
Perceived behavioural control	Effort expectancy	1. I think it will be easy for me to learn how to use deepfake technology in grief treatment.
Perceived behavioural control	Effort expectancy	2. I think it will be easy to teach my patients how to use deepfake technology as part of their grief treatment.

Note. * These items were already written in Dutch.

Appendix F

Correlations Between Independent Variables for Bereaved People

Table 2

Intercorrelations for Independent Variables Among Bereaved People (N = 136)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Kinship to the deceased[a]	--												
2. Wish to receive grief support from a psychologist, psychotherapist or psychiatrist[b]	-.04	--											
3. Acceptability	-.27	.23	--										
4. Appropriateness	-.23	.10	.87***	--									
5. Openness towards use innovative technologies	-.09	.17	.32***	.24*	--								
6. Concerns regarding data security	-.00	-.01	.36***	.39***	.29***	--							
7. Privacy and data protection	.09	-.18	-.49***	-.49***	-.25**	-.52	--						
8. Trust and safety	-.03	.03	.68***	.68***	.21*	.55***	-.53***	--					
9. Negative psychological consequences	.02	-.17	-.60***	-.57***	-.16	-.27**	.35***	-.63***	--				
10. Social influence	.01	.34	.57***	.53***	.36***	.37***	-.38	.53***	-.38***	--			
11. Feasibility	-.19	.01	.70***	.77***	.31	.36	-.34	.59	-.33***	.44	--		
12. Performance expectancy	-.20	.34	.83***	.24***	.33***	.30	-.48***	.59***	-.57***	.56***	.57***	--	
13. Effort expectancy	-.18	.02	.53***	.78***	.31***	.30	-.42***	.49***	-.43***	.36***	.49***	.43	--

Note. Cells contain Pearson's correlation for correlations between continuous variables (r). Cells contain point-biserial correlations for correlations between continuous and categorical variables (r_{pb}). Cells contain phi coefficients for correlations between categorical and categorical variables (ϕ).
* $p < .05$. ** $p < .01$. *** $p < .001$.

Appendix G

Correlations Between Independent Variables for Clinicians

Table 3

Intercorrelations for Independent Variables Among Clinicians (N = 91)

Variable	1	2	3	4	5	6	7	8
1. Acceptability	--							
2. Appropriateness	.78***	--						
3. Trust and safety	.41***	.36***	--					
4. Perceived benefits	.79***	.67***	.25*	--				
5. Negative psychological consequences	-.46***	-.46***	-.47***	-.24***	--			
6. Feasibility	.40***	.37***	.13	.37***	-.24*	--		
7. Performance expectancy	.65***	.70***	.47***	.62***	-.55***	.56***	--	
8. Effort expectancy	.36***	.25*	.08	.39	-.23*	.40***	.40***	--

Note. Cells contain Pearson's correlation (*r*).

* $p < .05$. *** $p < .001$.