Musical creativity support tools for bereavement support

Lee Cheatley a, Margareta Ackerman b, Alison Pease a and Wendy Moncur c

a University of Dundee, Dundee, UK; b Santa Clara University, Santa Clara, CA, USA; c University of Strathclyde, Strathclyde, UK

‘[ALYSIA] didn’t make me focus on the loss in a negative way...It was a comforting feeling... It was a warmth I felt when I felt the loss.’ – Study participant (P4)

ABSTRACT
Self-expression is central to mental well-being and mental health therapy. Art therapy offers a wide range of expressive mechanisms, allowing individuals to process their emotions when traditional therapies prove unsuccessful. However, a lack of expertise or comfort with artistic expression, along with cost and waiting times, may hinder one’s ability to receive needed mental health support. Creative machines can offer novel therapeutic approaches enabling the bereaved to engage in creative expression as and when needed. In this paper, we apply a co-creative songwriting system, ALYSIA, as a new form of therapy for those who had recently suffered the loss of a loved one. We evaluate the utility of this creative system in aiding bereaved individuals through user testing. The utility of collaborative creative systems for adaptation to bereavement is discussed and may have implications for other therapeutic applications.

KEYWORDS
Human–computer interaction; bereavement; computational creativity; songwriting; art therapy

1. Introduction

Most people will experience bereavement several times throughout their lives, yet each bereavement experience is unique. Emotional self expression is key to overcoming bereavement related grief and adapting to a world without the deceased (Love 2007). Formal interventions facilitate bereavement-related self-expression and understanding. Yet, traditional talk-based therapies have limited utility for those who may struggle expressing themselves verbally due to discomfort or limited emotional self-awareness. In response to this, mental health practitioners employ art-based approaches to therapy to encourage self-expression and emotional exploration for those uncomfortable doing so verbally.

Art therapies facilitate self-expression through broadened modalities, allowing clients to express themselves through creative mediums such as songwriting or painting. Artistic self-expression can not only increase comfort of expression but also help the client access unconscious thoughts and feelings (Heywood 2003). Unfortunately, arts therapies are ill-suited to those who lack trust in their own creative abilities or worry about having their creative work judged. Lastly, formal interventions are
often costly, and may not be available as and when needed.

We propose a new avenue for bereavement support – collaboratively creative bereavement systems. By using AI techniques, such systems can facilitate creative self-expression by supporting users in the creative process in a personalized manner. This paper studies how ALYSIA, an AI-based system that makes songwriting widely accessible, can support bereavement related self-expression; the system facilitates the creative process, helping users to express themselves and encourages emotional exploration. This approach facilitates self-expression and supports creativity, while also overcoming availability issues associated with formal interventions through the provision of affordable online support.

We present the results of a three-part study that evaluates the utility of the ALYSIA songwriting system to the bereavement context. Our study integrates qualitative research with thematic analysis along with quantitative analysis through the Wilcoxon signed-rank test. Results reveal that the ALYSIA system can support the bereaved individuals by enabling self-expression, re-framing engagement, and may enable the recognition of suppressed emotions. More broadly, our findings illustrate the promise of collaborative creative systems in a therapeutic context.

We begin with a review of relevant literature on bereavement interventions, bereavement support systems, computational creativity and the songwriting system, ALYSIA. Next, we outline the experimental setup and detail how the study was conducted. We then present the study results, focusing on the following themes which have emerged from the analysis: (1) supporting self-expression; (2) supporting engagement with bereavement and grief and (3) reframing engagement with bereavement. We conclude by summarizing the findings and discussing implications for the future of bereavement and wellbeing support.

2. Background

Grief is one of the most challenging experiences that most of us face during our lifetime. The passing of a loved one can increase the risk of mortality and carry significant risks to mental and physical health, including increased rates of heart attacks, strokes (Carey et al. 2014), increased blood pressure (Buckley et al. 2012) and aggravation of physical pain (Bradbeer et al. 2003). If participation in bereavement and grief is undertaken with little care, or avoided completely, these ill effects can amplify. Effectively coping with grief often necessitates the ability to engage with it, while a lack of engagement can prolong and complicate the process (Worden 2018).

While essential to the success of therapy, many find it difficult to express and engage with their grief: Patients may feel reluctant to express themselves in front of others, find themselves incapable of doing so verbally and fear judgement (Ryder and Hospice 2018). Helping the bereaved express themselves is a central goal of therapy. Mental health practitioners seek to provide a safe space in which people feel comfortable doing so (Rogers 1957). Some people, however, struggle to put their thoughts and feelings into words. This contributed to the rise of arts therapies, which have proven successful in helping some people express themselves and engage with their feelings (Lord 2018).

2.1. Grief and bereavement interventions

Grief includes the process of adapting to a world without the deceased whilst maintaining a place for them in their life (Klass, Silverman, and Nickman 2014; Worden 2018). The bereaved often oscillates between avoiding and interacting with their grief, both of which can be beneficial (Schut 1999). Formal interventions to support the bereaved include traditional person-centred therapy or counselling and person-centred art therapies (Arnason
However, traditional interventions can be difficult to access and their effectiveness is debated (Jordan and Neimeyer 2003; Ryder and Hospice 2018). Art therapies encourage patients to express themselves and explore their thoughts and feelings through creative mediums (i.e. songwriting), which better suits some people (Dalton and Krout 2005; Lord 2018; McClocklin and Lengelle 2018). Art therapies, similar to traditional ones, often have a series of formative sessions in which a therapeutic relationship is built to encourage expression. In the case of art therapies, this means the creative element is often absent until later sessions (O’Connor et al. 2003; Moss 2010; Kohut 2011). Art therapies reportedly have enabled people to express themselves, gain new insights, make sense of their loss and continue bonds with the deceased (McClocklin and Lengelle 2018). Writing has been seen as a way to (1) privately express feelings, (2) capture feelings as and when experienced, (3) facilitate verbal expression having worked through feelings to write them down and (4) as a means to normalize bereavement. Creative songwriting in a bereavement context has been found to provide a ‘structured flexibility’ to support group members to address their grief in an engaging manner and safe space. The songs created described as ‘emotionally challenging and deeply thought provoking’ and a means to understand ‘the experience of terminal illness, death and loss’ (Dalton and Krout 2006). A co-creative system to support expression could be an effective aid to undertaking similar work at home and in private.

2.2. Bereavement support systems

Most traditional bereavement interventions make relatively light use of technology, to facilitate communication via the phone, email or chat. When technology is used by bereaved people, the systems proposed or used focus less on creation and more on preservation and curation. People make memorial pages on websites such as Facebook and write to or about the person they have lost. These interactions can be helpful to the bereaved (Refslund Christensen and Sandvik 2015; Refslund Christensen and Gotved 2015; Christensen et al. 2017; Robinson and Pond 2019). However, the public nature of these methods may also put the bereaved in the presence of malicious users who can cause them emotional distress (Phillips 2015; Christensen et al. 2017; Sabra 2017; Robinson and Pond 2019).

Systems have been theorized and implemented on a small scale by HCI researchers, mostly focusing on the bereaved person curating digital possessions to be placed within a physical container (Banks, Kirk, and Sellen 2012) or accessing already curated possessions (Kirk, Reeves, and Durrant 2011; Odom et al. 2014). Moncur et al. (2015) had the bereaved record stories of the deceased, which was embedded into a memorial artefact (Story Shell). The bereaved found therapeutic value from this process. Moncur et al. report the therapeutic benefits were a result of the participant feeling that they had a receptive audience in the researchers, and could also be a result of continuing bonds with the deceased – the participant mentioned they found themselves addressing the deceased in some recordings. Despite this, Moncur et al. and the participant found other people were reluctant to contribute recordings for Story Shell as they were unsure what to record and wary of the recordings being shared. This suggests systems, much like therapies, that facilitate user participation in the creation of memorial objects could be helpful for the bereaved, while emphasizing the importance of being able to use such systems privately.

2.3. Computational creativity

As early as the nineteenth century, Ada Lovelace predicted the advent of a system that
‘might compose elaborate and scientific pieces of music of any degree of complexity’ (Babbage 1989, p. 270). AI has advanced considerably since Ada Lovelace’s time, and there is now a field of research (Computational Creativity) entirely dedicated to the creation of systems capable of undertaking creative tasks, including musical composition. Computational Creativity refers to:

The philosophy, science and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviours that unbiased observers would deem to be creative. (Colton and Wiggins 2012, p. 21)

Computational Creativity systems fall into two broad categories, autonomously creative systems, which aim to create independently, and co-creative systems, which act as creative collaborators to human partners. While some systems, such as the Painting Fool (Colton et al. 2015), aim for autonomous creativity, others have collaborative goals, aiming to assist humans in their creative endeavours. These include, for instance, Robert Keller’s Jazz improvisation system Impro-Visor (Kondak et al. 2016).

As these systems improve, the question of ‘why and for whom’ do we develop CC systems for becomes ever more important. Colton, Pease et al. (2015) touched on this question, defining creativity stakeholders as ‘people who may have something to gain or lose from software which is creative’ (Ibid., p. 2), and noted those they were aware of ‘researchers, the wider AI community, funding bodies, experts in the psychology of human creativity, neuroscientists, artists, art critics, journalists, philosophers, educators, the public, and so on’ (Ibid., p. 5). In this paper, we consider the inclusion of those who could benefit from the use of CC systems into the group of people for whom we develop those systems. Further, the means to provide support offers an additional reason for why we develop those systems.

Recent work has explored and posited design considerations for CC systems intended to operate in a therapeutic context (Cheatley, Moncur, and Pease 2019). Cheatley et al. identified 10 provisional design recommendations for CC in a bereavement context, that it should: (1) be available freely online; (2) output physical and digital possessions; (3) present framing information; (4) incorporate degradation into digital output; (5) require users participate in creation process; (6) allow for a varied source of input; (7) employ sentiment analysis; (8) allow for and foster repeated use; (9) allow private and collaborative creation and (10) be secure and private. Of these, some for instance (1, 8, and 10) are straightforward requirements for system developers. Many, such as (3), require further investigation to be thoughtfully designed.

We deem (5) to be one of the most fundamental requirements, since previous work conducted by Dalton and Krout (2006) and Moncur et al. (2015) found participation in the creation process can be therapeutic. In this paper, we focus on further exploring this particular requirement, while our case study and findings also overlap with some of the other requirements (such as 10).

One of the challenges identified in Cheatley, Moncur, and Pease (2019) is to encourage people who may not think of themselves as creative to engage in a creative process. Co-creative systems can be applied in the bereavement context to overcome this challenge. Their creative abilities offset or even eliminate the need for any artistic expertise on the part of the bereaved and as such extend creative self-expression and the benefits of art therapy.

3. Aims and motivation

This paper explores the potential for ALYSIA to support the bereavement process. By offering a flexible co-creative framework that facilitates self-expression, ALYSIA provides an opportunity for those not as musically confident to pursue the benefits of the more creative art therapies. This presents new possibilities
and directions for co-creative systems: offering therapeutic value through artistic self-expression to those without the corresponding training and expertise. In addition to the fundamental offering of a creative partnership that offsets the need for artistic expertise, co-creative systems may carry additional benefits in the form of wide accessibility and cost efficiency.

4. Methods

An evaluative research study (‘user testing’) was conducted to explore whether the process of co-creating a song with a computationally creative system can help bereaved people interact with their bereavement. Research sessions took place at the houses of participants and involved the researcher introducing participants to ALYSIA before giving them access to the system to create a song – comprised of four lines of lyrics. The introduction to ALYSIA was done through showing participants one introductory video to ALYSIA in general and two videos that introduced the co-creative process and how they could interact with the system. Participants were given time to rewatch the videos or ask any questions before they were then asked to create a song related to their bereavement experience. Before using ALYSIA each participant was asked to complete the Warwick–Edinburgh Mental Wellbeing Scale (WEMWBS). The WEMWBS (Warwick Medical School 2020) is a validated 14-item scale designed to measure mental wellbeing in the general population, by having respondents rate 14 statements (i.e. ‘I’ve been dealing with problems well’) on a 5-point scale from ‘None of the time’ through to ‘All of the time’. The WEMWBS was utilized for two reasons. The first was to determine their wellbeing prior to taking part in the study to identify anyone for whom participation may have been potentially problematic. The second reason to allow quantitative comparison before and after participation in the study to explore whether using ALYSIA had led to changes in their wellbeing. WEMWBS documentation indicates an average change of 3 is deemed a meaningful change as it means scores have improved or worsened by 1 point on three items or by 3 points on one item on three items have improved or worsened by 1 point or scores (Putz et al. 2012). Participants were presented with the WEMWBS on paper and asked to fill it out independently. After completing the WEMWBS for the second time, the participants took part in semi-structured interviews. These semi-structured interviews sought to elicit insights on: their experience using the system; listening to the song; engagement with bereavement and their receptiveness to such systems. See Figure 1 for an example of song lyrics depicted on ALYSIA’s karaoke screen, the final creation screen.

Prior to this study, the researcher who worked directly with the subjects underwent mental health first aid training offered by the National Health Service (NHS) in Scotland. This provided the researcher with an understanding of how to identify when participants require support and how to provide support when necessary. During research sessions, the researcher sat at a comfortable distance alongside the participant. Participants were informed that the researcher was available to them should they need help with the co-creative experience, any aspect of the system or any other issues that may arise. The possible impact of the researchers presence is addressed later, predominantly in Section 5.1 under the subhead of Comfort.

4.1. Song co-creation procedure

ALYSIA (Ackerman and Loker 2017) is a co-creative system that removes the barriers that traditionally block most non-musicians from the creation of original songs, allowing everyone to express themselves through this art form.
ALYSIA at the time of the study was available as a native iOS app and was accessed by participants via an iPad. Participants interacted with the system using the touchscreen functionality of the iPad. Participants, when using ALYSIA, were first tasked with selecting a musical genre for their song (e.g. Rock or Jazz), and from there were asked to select or input (type) topics (e.g. love, and longing) that would influence the lyrics suggested in the following co-creation stage. Once participants had selected the genre and finalized their topics they were presented with four blank lines to populate either by writing their own or by selecting from a series of lyrics suggested to them (or both). ALYSIA was powered by WaveAI’s custom AI for lyric and melody generation.

For this study, users created short songs consisting of four lines of lyrics, equivalent to a single short verse or chorus. Once users had written, selected or edited their four lines of lyrics they were asked to choose a vocal melody. The vocal melodies generated by ALYSIA fit both the user’s lyrics and backing track selected earlier in the process. The vocal melodies, selected one line at a time, could be further edited by the user. After the vocal melodies were created, users could either have ALYSIA sing their song in a male or female in-app automated voice or record themselves singing it. ALYSIA allows novices to rely on its suggestions to get started, while allowing users to input their own lyrics or vocals as part of the co-creative experience whenever they choose to do so.

4.2. Recruitment and participants

For inclusion participants had to be over the age of 18, speak English fluently (to ensure participants understood what they were asked to do and the potential implications of participation), and to have been bereaved for no less than 6 months to reduce the risk of engaging with those at increased risk of emotional distress. There were no exclusion criteria set for gender, country of origin, etc. We recruited a total of seven participants through contacts made in previous studies and snowball
sampling. Participants have been anonymized via the assignment of pseudonyms (P1–P7). P1 was a 28-year-old female who had been bereaved of her grandmother less than a year ago. P2 was a 57-year-old female who had been bereaved of her mother less than a year ago. P3 was a 56-year-old male who had been bereaved of his spouse 5–10 years ago. P4 was a 69-year-old male, who had been bereaved of his spouse 5–10 years ago. P5 was a 25-year-old male who had been bereaved of his grandmother 1–2 years ago. P6 was a 28-year-old male who had been bereaved of his great uncle. P7 was a 25-year-old female who had been bereaved of her grandmother 1–2 years ago. All but two of the participants (P5 and P6) indicated, on a scale of 1–5 (1 = not close at all, 5 = very close), that they were very close to the deceased. P5 scored their closeness to the deceased as a 3, and P6 as a 2. The perspective of the data gathered, and the subsequent findings have been influenced by these demographics.

4.3. Musical experience

Of the three participants only one (P3) indicated they had musical experience. P3 commented they play several musical instruments and had written songs in the past but despite this did not consider themselves an experienced songwriter.

4.4. Ethics and limitations

The University of Dundee (UK) granted ethical approval for the research, and all participants provided written informed consent to participate. We acknowledge some limitations of the study. The participants did not use the system by themselves, they did so with a researcher present.

4.5. Analysis

The WEMWBS results were analysed using a combination of parametric and non-parametric statistical tests as and when appropriate. The Shapiro–Wilk Test, due to the small sample size, was run to determine whether data was normally distributed and thus suitable for parametric analysis. The subsequent statistical tests were done so in line with the above and in line with tests recommended for use with WEMWBS data. The interview transcripts were analysed using Thematic Analysis as described by Clarke and Braun (2013). This consisted of the researcher coding data, identifying themes across this coded data, and refining these codes and themes. NVivo 12, qualitative analysis software, was used to do this.

5. Interview results

We present results from the interview, where four key themes were identified in the interview data related to the participant’s experience of using ALYSIA in a bereavement context: (1) support expression; (2) support engagement with bereavement and grief; (3) reframe the engagement and (4) receptiveness to ALYSIA.

5.1. Support expression

5.1.1. Self-efficacy

Participants expressed doubt in their ability to create a song and were particularly concerned whether they would be able to create a song that honoured and reflected the deceased. P1 remarked ‘I think starting is going to be the hardest part’, and P2 commented ‘It is quite hard, I’m not very musical.’ P1 went on to say, ‘Writing a song is quite hard, especially if you have never done it before. It isn’t something you think yourself good at. I’ve never been much of a writer, and songs are largely lyrics’.

Participants voiced concern on whether the songs they create would do justice to the deceased. P1 felt the creation process was ‘daunting because I did not know how to start it, and what to write, because I wanted
to do it justice’. P2 commented that they wanted the song to sound ‘nice because you want it to reflect the person, so you don’t want to do a bad job’. Similarly, P7 wished to create a song reflective of the deceased, ‘It is hard because she was so charismatic, funny, and charming, and it is like trying to find a song or lyrics that actually show that’.

5.1.2. Custom vs. ALYSIA-suggested lyrics
Despite the above doubts, all of the participants successfully created a song and felt that ALYSIA helped them express themselves. Many of the participants ended up writing their own lyrics, despite expecting to rely on ALYSIA’s suggestions more heavily. P1 commented that they went into the study believing they would rely entirely on ALYSIA’s generated lines, but ended up writing three out of four lines by themselves. P1 felt that being able to ‘shuffle through a lot of [lyric] suggestions was really helpful…and it wasn’t showing the same ones again which was nice’.

P1 went on to remark that using the system ‘was good’ but ‘hard because there were so many decisions that I could make. It was hard to start the song, it ended up I wrote three of the lines in it [the song] myself and only used one generated line’. P7 also went into the study expecting to use ALYSIA generated lines, but remarked

Some of the phrases and stuff it suggested were quite good and quite funny. Obviously I ended up using one…autogenerated one, but more often than not it was just my lyrics, but it definitely helped me get there. I don’t think I would have got there without them.

Three participants used solely ALYSIA generated lyrics, but felt these helped them express things they hadn’t realized they felt. P3 commented ‘I thought the lyric writing part gave you a lot more flexibility…instead of asking what you thought it gave you lots of things and you could pick out ones you maybe didn’t realize you thought. That was very clever’, and went on to remark ‘The lyrics part I thought was interesting because I thought it was going to be really hard to think up lyrics but then there were lots of them there and so that made it really straightforward’. P5 remarked that it was quite ‘difficult to actually think of the lyrics, but then having the suggestions made it a lot easier’.

5.1.3. Comfort
Participants largely felt comfortable using ALYSIA to express their bereavement. Some participants remarked that the presence of the researcher slightly impaired their comfort, as did singing and listening to the recording in front of the researcher. P1 shared that listening to the song with someone else there ‘made it a bit more uncomfortable because it is quite a personal thing, writing a song and then having it played multiple times as you are attempting to sing it in front of other people’. Despite this, P1 reported they felt comfortable writing about their bereavement experience, because ‘There wasn’t much pressure on me to write it…I didn’t feel like you were waiting on me to finish – you didn’t mind waiting’.

Presence of Researcher: Some participants, in particular P2, remarked that expressing themselves in the formal context of a study in the presence of a researcher made interacting with their feelings more challenging than it may have been to do so in private. Some participants reported the presence of the researcher made them a little less comfortable expressing themselves. While most participants expressed preference for using the system privately, P4 felt that the presence of the researcher positively contributed to the experience. P4 believed hearing themselves sing the song, and discussing it with the researcher
helped to reinforce their feelings and made them glad they took part in the study.

P7 felt comfortable expressing themselves, but was worried what other people would think if they got access to the song. P7 went on to say, ‘I guess I worry about what other people think but I don’t know why I should because it is not their grieving’. P2, on the other hand, reported that they felt ‘more uncomfortable’ because of the formal setting. P2 felt ‘a bit put on the spot’ but commented ‘if I was doing it privately…you didn’t have to share then that would probably be better, more therapeutic. I think because, I guess, in an interview you have a certain judged element to it because someone else is hearing it too, not just you.’

Overall, participants felt the system helped them express themselves. P2 shared that ‘this helps towards making people creative because it is like you have got someone else there you are bouncing ideas off’. P2 went on to theorize that in a bereavement context, a creative aid such as this would let you bounce ideas off the system in private ‘which you probably want to do if you are in a grief situation’ rather than doing so with other people. P3, despite feeling a little constrained by the system, said ‘I thought it [creating a song] was going to be hard but it wasn’t. It was really fine. I think it is because I found things [lyrics] that worked for me’.

### 5.1.4. Creative control

Participants felt ALYSIA gave them control over how they expressed themselves. P1 felt ALYSIA gave them a lot of control actually, I was surprised. You can choose your melodies and things like that, the background music, and you can choose different genres ... I chose a country song which I don’t think I would have thought that I’d have chosen going into it. It gives you a large variety and you can change that depending on your mood, and you can go back and change things if you change your mind.

P5 described ALYSIA as giving them ‘total freedom to do what you want’, and P6 felt ALYSIA gave them ‘enough input’. P2 expressed the desire for a more natural in-app singing voice. P7 wanted to have greater control over how the lyrics were to be sung. Participants liked that they had control over whether their songs would be shared with anyone else. Many of them felt that they would like to share the songs with their immediate families, whilst P7 remarked they would have been more comfortable using the system if they knew no one would be able to access their song.

### 5.2. Support engagement with grief and bereavement

Participants reported that creating a song with ALYSIA helped them engage with their grief and bereavement experience. Participants remarked that creating a song with Alysia had helped them: (1) Interact with their feelings; (2) Reminisce; (3) Create personalized songs; (4) Continue bonds; (5) Accept the reality of their loss and (6) Facilitated communication with other people.

#### 5.2.1. Interaction with feelings

All of the participants felt that using ALYSIA helped them interact with their bereavement related feelings, and in some cases made them aware of bereavement-related feeling of which they were not previously aware.

P1 remarked

You are always going to miss someone when they are gone, really, but I think writing about it and especially just being able to hear it played back and then being able to sing along really helped me come to terms with what I had written and how that could be interpreted – how sad it could be and things like that...I guess I was sadder about it than I realize, but not in a bad way.
P1 went on to comment that playing the song back ‘helps you realize what you have written and how you are feeling about it, because you are actually hearing it,’ and that sometimes hearing the lyrics back made me feel a bit emotional and sad...it has made me feel kind of better about it. It made me realize how much I miss her but I think it is quite good to remember people that you have lost and to think back on the fond memories, so they are not forgotten.

P2, like P1, experienced sadness creating the song, ‘I guess it made me feel a bit sad because I was focused on something I didn’t really want to focus on, I guess’, but ‘I didn’t feel as sad listening to the song’. P2 theorized this was because they were ‘trying to put [their] feelings into words’ which they found challenging. P2 felt they had not had time to engage with their bereavement and that they had to squash it down at the time, because it is not about you, it is about making sure other people are okay. Whereas this is you focusing on you when you are trying to write what did it mean to you which is harder.

P4 felt that choosing the mood themes ‘touched the emotional part of me. I picked words that meant something to me’, and that creating the song let them ‘get that emotion out of myself and into something else’.

P5 also felt ALYSIA afforded bereaved people the opportunity to ‘put all their emotions, and all their thoughts at that time down into a song. No matter how depressing or horrible and sad it is’ and that when they were ‘feeling a bit better, not over it, but that they had dealt with it, they can listen to it and realize that they have actually dealt with it quite well, and it is not as bad as it was back then’.

Participants reported that the lyrics generated by ALYSIA helped them interact with their feelings. P3 felt the lyric suggestions were ‘helpful’, ‘very reflective’ and ‘made me think about things I didn’t realize I was thinking about because it [ALYSIA] made suggestions’.

5.2.2. Facilitate reminiscence

Participants also felt ALYSIA helped them reminisce about the person they lost. P1 spoke of how one line suggested by ALYSIA reminded them of the person they had lost as it spoke of the sea, and the participant spent a lot of time with the deceased on the coast. P1 remarked ‘It allowed me to kind of remember all of my past, favourite memories and things like that to try and inspire me to write the song and to come up with lyrics...’ P1 went on to say ALYSIA provided them with an opportunity ‘to think about my grandma and going back on the memories and things you kind of forget about when you’re just living day to day. It was nice. I liked it. There are little parts in the song that bring up other memories’. P1 added that, ‘I enjoyed it. I left feeling better about it, and about my relationship with my grandma because I was remembering all the good past moments’, and that ‘It made me feel happy’.

P2 felt that creating a song was an unusual experience, but felt that using ALYSIA made me focus a bit more on the good memories and what I enjoyed...it helped me think back on things you would want to be in a song. You want to remember the happy times, or at least I do...It is quite nice to have that preserved in your own way.

P5 remarked that ALYSIA allowed them to ‘reminisce without getting upset’, and made them ‘think about the person more deeply’ than they would in everyday life.

P6 also spoke of ALYSIA’s ability to facilitate reminiscence, ‘[using ALYSIA] makes you reminisce about the person which is quite good’, and ‘It is just nice to actually think back to what they were like, so that is quite good’. P7 made similar comments,

I definitely feel better after it [creating a song with ALYSIA]...it is sort of nice to sit down and properly think about her and the good times rather than just missing her and stuff like that. It is nice to reflect on that positive stuff
and remarked that the song ‘made me laugh, so it made me feel happy and reminded me of her. I feel like she would have been happy or pleased with it’.

5.2.3. Create personalized songs
Participants spoke about the personal nature of expressing themselves and creating a song related to someone that they have lost. P1 liked that ALYSIA let them sing themselves, stating

“It was nice to be a part of the song in that way as well [singing it], so I kept the woman [ALYSIA] singing alongside me because she helped me keep my tune but it was nice to be part of it.

P1 went on to say it was

quite personal [writing and singing the song] but I guess most song writing is…it is very personal for me because it is written for her. She would probably really like it, the idea of it, someone is writing a song about her.

P1 sought to keep the song vague to ensure personal details were not shared outside the family of the deceased. P3 and P5 also felt singing the song would have made it a more personal experience and more personal resultant song. P3 felt if they had sung their song it would have been ‘a lot more personal’. P7 felt the song was personal and was worried about the possibility of someone else stumbling upon the song, listening to it, and judging it.

P2 and P7 had very specific music genres and artists in mind and could not find anything suitably similar, and as such felt their songs were less personal. P4 felt using ALYSIA by itself depersonalized the experience, but that using ALYSIA with another human present and discussing the process and song was helpful and make it more personal. However, P4 did find a genre of music that is personal to them and the suggested moods spoke to their experience, which helped make the song and experience more personal.

5.2.4. Continue bonds
Many of the participants made comments suggesting that using ALYSIA had helped them to continue bonds with those they lost. P1 felt that the system had helped them remember the deceased, and remarked ‘I think it is quite good to remember people that you have lost and to think back on the fond memories of them so they are not forgotten’. P4 more explicitly spoke of continued bonds with the deceased, commenting that creating and listening to a song with ALYSIA ‘reinforced the fact that she is still inside me. It made me feel closer to her, if you like. Made me feel close to her because the words were coming out, and the song made me feel close’.

P4 went on to remark that singing the song and writing the lyrics made them feel closer to the deceased, but singing them more so because they felt as if they were singing to the deceased. P4 felt using ALYSIA had created a ‘closeness, where you feel you are still connected with the person which is always helpful’ and that using the system ‘...made the closeness a wee bit more intense, which is nice’ and that the intensity of the closeness felt made it ‘Almost like she was still here’. P5 also believed using ALYSIA gave them ‘a connection to the person because you’re not trying to copy what they listen to, but obviously you want it to be reminiscent of what they were into’ and that it made them think about the person more deeply than they would in everyday life.

5.2.5. Accept reality of loss
Some of the participants felt using ALYSIA helped them accept the reality of their loss. P1 commented that it would not have crossed their mind to write a song about their bereavement experience or the deceased but that it

helped because I find it good to think back and remember the good times and to try and kind of express the feelings of loss about them no longer being here because that is hard to come to terms with that you’re not going to create new
memories with them again. If you have kids and stuff they aren’t going to meet them, this is kind of hard.

P1 went on to say ‘I think it has just made me realize how much I miss her as well’, and that taking part in the study helped them ‘come to terms’ with the loss ‘a bit more and made me realize maybe how sad I am about it still’. P4 remarked that using ALYSIA had made them feel ‘a deep sense of loss, but it made me aware of what I had lost. What I had lost, yet not lost. I’ve only lost her physically.

One participant, P4, spoke at length about how they felt using ALYSIA with the researcher present and subsequently being interviewed, which added to ALYSIA’s therapeutic value. P4 reported that they found ALYSIA helpful but that there was no ‘comfort’ in the system. They felt there needed to be a human present, to hear them, and to provide support. P4, additionally, felt that the presence of another human would ensure they used ALYSIA properly. They went on to comment ‘digital things can be helpful, they can be tools that the human being can use to aid the process, but I don’t think one survives without the other’. P4 believed that ALYSIA was one element of a ‘full package’ and that to achieve maximum effect should be used with another human, and the process and song should be discussed afterwards. They described ALYSIA as pain medication, and said whilst it is helpful, it does not solve what is causing the pain.

5.2.6. Reframe engagement with grief and bereavement

Most of the participants felt that ALYSIA had reframed their engagement with feelings and memories associated with their loss. P1 remarked ‘It was nice to be able to think about her in a way that was different, because I was trying to create something from my memories of her so it was quite nice being able to do that’, and that ALYSIA had helped them ‘focus more on the positive memories of her [the deceased]’ rather than the negatives, ‘which I think is a nice thing to do, especially when the person is gone’.

P1 went on to say it was ‘fun trying to use the system and to hear my voice back and things like that. It kind of made you forget about the feelings of sadness associated with loss’. P1 felt ‘quite happy’ when writing the song, but when they listened to it they ‘got quite sad because I realized what I had written, but it was fun’. P2, likewise, was distracted from feelings of loss when they reached the lyrics section of the system and commented ‘the creative element takes over and you are focused on a creative task…you are removing yourself from that loss, I guess that is helping you move forward if you are stuck in negative feelings’ and remarked selecting happier moods or themes could help direct people down a ‘more positive path’.

P4 felt using ALYSIA didn’t make me focus on the loss in a negative way. It wasn’t a negative feeling of loss. It was a comforting feeling, some strange way it was comforting. It was a warmth I felt when I felt the loss.

P5 also felt ALYSIA focused them on completing a creative task, rather than an emotional one,

I wouldn’t say it distracts you. I would say it takes you to a different way of thinking about it. You’re not thinking about it as “Oh, she is dead”, you’re thinking about it as if “I’m writing a song about this person who has passed away. What do I want the song to sound like, what would they want it to sound like?”

P6 stated using ALYSIA ‘framed’ their engagement with the bereavement and their feelings ‘differently’ and that when they were using ALYSIA it didn’t make them think about the loss but on what the deceased was like.

5.3. Receptiveness to ALYSIA

Participants spoke favourably about ALYSIA and found it helpful, and expressed desire to create additional songs with the system. P1 shared
I think this does help process what has happened because it makes you think about it a bit more or think about your time with the person or what you are feeling and I think writing them down and expressing them kind of helps you come to terms with it.

Most of the participants reported they enjoyed or had fun using ALYSIA, and there was laughter throughout the process despite the context of the study. All of the participants believed a system such as ALYSIA could prove beneficial to bereaved users. Many of the participants stated they would use the system again, and in a bereavement context, but only a few wanted a copy of the song they created. Three participants listened to their song enough times that they remarked it would be stuck in their head. Another three participants who were bereaved of the same person and were interviewed on the same day at their home, wanted to share their songs with each other.

5.4. WEMWBS results

Despite this, an independent t-test showed that younger participants (age 16 – 39) had a statistically significant higher change in their wellbeing score (5 ± 3) than older participants, aged 55 and above (−2 ± 1), $t(5) = 3.709, p=0.014$. Additionally, three of the participants experienced what the WEMWBS guide describes as ‘meaningful positive change’, seeing an increase of at least 3 in their WEMWBS score. Only one participant experienced ‘meaningful negative change’, having a decrease of at least 3. These changes in wellbeing score were influenced by age in a statistically significant way, with younger people experiencing an increase in their wellbeing score and older participants experiencing a small decrease.

6. Discussion and conclusion

We performed a study on the application of a collaborative creative system, ALYSIA, for supporting bereaved individuals. A combination of qualitative and quantitative methods were utilized. The results of the WEMWBS suggest that ALYSIA may be an effective tool for younger generations, particularly those under the age of 30. This is likely a consequence of greater comfort with technology experienced by those who have grown up with digital technology. Consequently, collaborative creative systems may continue to increase in relevance and utility for bereavement therapy.

The interviews shed light on the experiences of participants using the ALYSIA songwriting system in a bereavement context. Despite expressing uncertainty in their capacity to write songs, participants reported that ALYSIA made it possible to do so and to emotionally express themselves through this medium. Self-expression is viewed as one of the most important ways to cope with bereavement and grief (Love 2007). Participants were moved by ALYSIA’s lyric suggestions and felt that the suggestions related to their own experiences. Furthermore, for some participants, like P3, ALYSIA’s lyric suggestions enabled them to recognize feelings of which they had no prior awareness. This could prove beneficial for people who experience difficulty identifying and expressing their feelings, and could be explored further in relation to suppressed and repressed emotions.

Participants were deeply engaged in the creation of original lyrics, editing ALYSIA’s suggestions and writing more of their own material than they had originally expected. This shows that systems like ALYSIA have the potential to facilitate self-expression related to difficult topics and enable people with varied creative capabilities to complete creative tasks. Further, as some of the participants hypothesized, ALYSIA may prove beneficial in supporting children, who often struggle comprehending and expressing feelings associated with bereavement. People suffering from symptoms of anxiety and depression,
particularly when overlapping with bereavement related grief, are less likely to engage in emotional disclosure (Kahn and Garrison 2009). Children find it particularly challenging to comprehend and express feelings associated with the loss of a loved one (Segal 1984). Arts therapies have been shown to help children express themselves and cope with grief (Moody and Moody 1991), and as such, expanding children’s capabilities for creative self-expression through the aid of collaborative creative systems, such as ALYSIA, may prove beneficial.

ALYSIA helped participants undertake and achieve tasks that formal interventions for bereavement often seek to facilitate. Participants reported that using ALYSIA not only supported their self-expression but also helped them to identify feelings that they were not previously aware of, as well as accept the reality of their loss, reminisce, and continue bonds with the deceased – all of which have been found to be beneficial for bereaved people in adapting to and overcoming their bereavement and grief (Love 2007; Klass, Silverman, and Nickman 2014; Worden 2018).

Participants further reported that ALYSIA reframed engagement with their bereavement and grief. Throughout the songwriting process, participants were largely not focused on the loss of the person or associated negative feelings, but rather became engrossed in the creative task or engaged with happy memories. By focusing on creative tasks, these systems can help users to engage with their bereavement and grief in ways that lessen the associated negative emotions.

Participants expressed a couple of recommendations pertaining to system design, particularly a more natural in-app singing voice, and increased control on the background track, such as allowing users to input their own music into the system during the creation process. The most pressing concern, however, was the presence of the researcher, which was experiences as an audience. Most participants reported that they would have felt more comfortable using the system in private. This

Figure 2. WEMWBS results pre- and post-ALYSIA use, including change, segmented by age. All participants had moderate well being, allowing them to participate in the study. Younger participants saw an increased score following the study. An increase or decrease of at least 3 in the WEMWBS score is considered a meaningful change.
suggests that private use could be more therapeutically beneficial to the bereaved, giving them the freedom to express themselves without the risk of judgement. On the other hand, one participant felt that the presence of the researcher and subsequent interview augmented the therapeutic value of the system. This suggests that, for some, perhaps older individuals, the ability to use the system with other human co-creators could be beneficial.

Statistical tests have shown that these differences are likely influenced by age, and that younger users are likely to experience an increase in their wellbeing. ALYSIA offers bereaved people the privacy to comfortably express themselves through song, whilst providing them with the benefits of a non-judgmental collaborator that facilitates user creativity.

In this paper, we have shown that the use of co-creative systems such as ALYSIA in a bereavement context can contribute to changes in user wellbeing. The interactive co-creative process, which invited participants to engage in the creative process of songwriting opened up opportunity for emotional expression. We stress that ALYSIA is designed to support the human creative process (in addition to helping them create a meaningful creative product). Even users who did not believe that they would be able to write a song found themselves making their own lyrical lines. As such, the co-creative process builds confidence and encourages self-expression. We believe that the co-creative process is core to the promising results of this study, and encourage future research on the therapeutic potential of AI-based systems that centre on enabling human creativity.

We believe that the potential of collaborative creative systems is not limited to bereavement and could be beneficial for other mental wellbeing challenges, such as anxiety and depression. Likewise, we posit that the therapeutic value of collaborative creative systems is not limited to songwriting, and may span other creative pursuits, such as painting and storytelling. Therapeutic support through collaborative creative systems can be accessible, affordable and private. Through interaction with creative machines, users with diverse creative abilities will be able to better connect to themselves and reap the therapeutic benefits of engaging with their emotions.

Disclosure statement
No potential conflict of interest was reported by the author(s).

Funding
This work was supported by Engineering and Physical Sciences Research Council [1816118].

Notes on contributors
Lee Cheatley is a User Researcher at a global learning and development company. Dr Cheatley received his PhD from the University of Dundee, Scotland. His research interests include human-computer interaction, emerging technologies, artificial intelligence, computational creativity, bereavement, and wellbeing.

Margareta Ackerman is a Professor at Santa Clara University in the USA. Professor Ackerman received her PhD from the University of Waterloo, Canada. Her research interests include artificial intelligence and computational creativity.

Alison Pease is a Senior Lecturer at the University of Dundee in Scotland. Dr Pease received her PhD from the University of Edinburgh, Scotland. Her research interests include argumentation, mathematics, and computational creativity.

Wendy Moncur is a Professor at the University of Strathclyde in Scotland. Professor Moncur received her PhD from the University of Aberdeen, Scotland. Her research interests include online identity, reputation, trust and cybersecurity.

ORCID
Lee Cheatley http://orcid.org/0000-0002-8216-1603
References

Ackerman, M., and D. Loker 2017. “Algorithmic Songwriting with Alysia.” In International Conference on Evolutionary and Biologically Inspired Music and Art, 1–16. Springer.
Arnason A 2001. “Experts of The Ordinary: Bereavement Counselling in Britain.” Journal of the Royal Anthropological Institute 7 (2): 299–313.
Babbage C 1989. Science and Reform: Selected Works of Charles Babbage. Cambridge: Cambridge University Press.
Banks R., Kirk D., and A. Sellen 2012. “A Design Perspective on Three Technology Heirlooms.” Human–Computer Interaction 27 (1-2): 63–91.
Bradbeer M., Helme R. D., Yong H.-H., Kendig H. L., and Gibson S. J. 2003. “Widowhood and Other Demographic Associations of Pain in Independent Older People.” The Clinical Journal of Pain 19 (4): 247–254.
Buckley T., Sunari D., Marshall A., Bartrop R., Carey I. M., Shah S. M., DeWilde S., Harris T., Victor, L., and Moncur W., and Pease A. 2019. Bereavement Interventions. Correlates of Bereavement and the Impact of Bereavement Interventions,” Dialogues in Clinical Neuroscience 14 (2): 129.
Carey I. M., Shah S. M., DeWilde S., Harris T., Victor, C. R., and Cook D. G. 2014. “Increased Risk of Acute Cardiovascular Events After Partner Bereavement: A Matched Cohort Study.” JAMA Internal Medicine 174 (4): 598–605.
Cheatley L., Moncur W., and Pease A. 2019. “Opportunities for Computational Creativity in a Therapeutic Context.” In International Conference on Computational Creativity, Charlotte, North Carolina, USA, 341–345. Association for Computational Creativity.
Christensen D. R., Hård af Segerstad Y., Kasperowski D., and Sandvik K. 2017. “Bereaved Parents’ Online Grief Communities: De-’Tabooing Practices or Relation-Building Grief-Ghettos?” Journal of Broadcasting & Electronic Media 61 (1): 58–72.
Clarke V., and Braun V. 2013. “Teaching Thematic Analysis: Overcoming Challenges and Developing Strategies for Effective Learning.” The Psychologist 26 (2): 120–123.
Colton S., Halskov J., Ventura D., Gouldstone I., Cook M., and Ferrer B. P. 2015. “The Painting Fool Sees! New Projects with the Automated Painter.” In International Conference on Computational Creativity (ICCC), Provo, Utah, 189–196. Brigham Young University.
Colton S., Pease A., Corneli J., Cook M., Hepworth R., and Ventura D. 2015. “Stakeholder Groups in Computational Creativity Research and Practice.” In Computational Creativity Research: Towards Creative Machines, 3–36. Paris: Atlantis Press.
Colton S., and Wiggins G. A. 2012. “Computational Creativity: The Final Frontier?” In Ecai, Vol. 12, 21–26. Amsterdam: Montpelier.
Dalton T. A., and Krout R. E. 2005. “Development of the Grief Process Scale Through Music Therapy Songwriting with Bereaved Adolescents.” The Arts in Psychotherapy 32 (2): 131–143.
Dalton T. A., and Krout R. E. 2006. “The Grief Song-Writing Process with Bereaved Adolescents: An Integrated Grief Model and Music Therapy Protocol.” Music Therapy Perspectives 24 (2): 94–107.
Heywood K 2003. “Introducing Art Therapy Into the Christie Hospital Manchester UK 2001–2002.” Complementary Therapies in Nursing 9 (3): 125–132.
Jordan J. R., and Neimeyer R. A. 2003. “Does Grief Counseling Work?” Death Studies 27 (9): 765–786.
Kahn J. H., and Garrison A. M. 2009. “Emotional Self-Disclosure and Emotional Avoidance: Relations with Symptoms of Depression and Anxiety.” Journal of Counseling Psychology 56 (4): 573.
Kirk D. S., Reeves S., and Durrant A. 2011. “Spomenik: Augmenting Memorials in the Woods.” In Proceedings of 2nd All Hands Meeting for the Digital Economy (Digital Engagement 2011). Citeseer.
Klass D., Silverman P. R., and Nickman S. 2014. Continuing Bonds: New Understandings of Grief. London: Taylor & Francis.
Kohut M. 2011. “Making Art From Memories: Honoring Deceased Loved Ones Through a Scrapbooking Bereavement Group.” Art Therapy 28 (3): 123–131.
Kondak Z., Konst M., Lessard C., Siah D., and Keller R. M. 2016. “Active Trading with Impro-Visor.” In Proceedings of the Seventh International Conference on Computational Creativity (ICCC 2016), edited by François Pachet, Amilcar Cardoso, Vincent Corruble, Fiammetta Ghedini. Paris, France: Sony CSL.
Lord H 2018. “Creative Health: The Arts for Health and Wellbeing.” Perspectives in Public Health 138 (1): 26–27.
Love A. W. 2007. “Progress in Understanding Grief, Complicated Grief, and Caring for the Bereaved.” Contemporary Nurse 27 (1): 73–83.
McClocklin P. A., and Lengelle R. 2018. “Cures for the Heart: A Poetic Approach to Healing After Loss.” British Journal of Guidance & Counselling 46 (3): 326–339.

Moncur W., Julius M., Van Den Hoven E., and Kirk D. 2015. Story Shell: The Participatory Design of a Bespoke Digital Memorial. In Proceedings of 4th Participatory Innovation Conference, The Hague, Netherlands, 470–477. University of Applied Sciences.

Moody R. A., and Moody C. P. 1991. “A Family Perspective: Helping Children Acknowledge and Express Grief Following the Death of a Parent.” Death Studies 15 (6): 587–602.

Moss J 2010. “Sunflowers on The Road to NASA: Writing in Bereavement.” Bereavement Care 29 (2): 24–29.

Newsom C., Schut H., Stroebe M. S., Wilson S., Birrell J., Moerbeek M., and Eisma M. C. 2017. “Effectiveness of Bereavement Counselling Through a Community-Based Organization: A Naturalistic, Controlled Trial.” Clinical Psychology & Psychotherapy 24 (6): O1512–O1523.

O’Connor M., Nikoletti S., Kristjanson L., Loh R., and Willcock B. 2003. “Writing Therapy for the Bereaved: Evaluation of An Intervention.” Journal of Palliative Medicine 6 (2): 195–204.

Odom W. T., Sellen A. J., Banks R., Kirk D. S., Regan T., Selby M., Forlizzi J. L., and Zimmerman J. 2014. “Designing for Slowness, Anticipation and Re-Visitation: A Long Term Field Study of the Photobox. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 1961–1970. New York, NY: Association for Computing Machinery.

Phillips W 2015. “Loling at Tragedy: Facebook Trolls, Memorial Pages, and the Business of Mass-Mediated Disaster Narratives.”

Putz R., O’Hara K., Taggart F., and Stewart-Brown S. 2012. “Using WEMWBS to Measure the Impact of Your Work on Mental Wellbeing: A Practice-based User Guide.”

Refslund Christensen D., and Gotved S. 2015. “Online Memorial Culture: An Introduction.” New Review of Hypermedia and Multimedia 21 (1-2): 1–9.

Refslund Christensen D., and Sandvik K. 2015. “Death Ends a Life Not a Relationship: Timework and Ritualizations At Mindet. Dk.” New Review of Hypermedia and Multimedia 21 (1-2): 57–71.

Robinson C., and Pond R. 2019. “Do Online Support Groups for Grief Benefit the Bereaved? Systematic Review of the Quantitative and Qualitative Literature.” Computers in Human Behavior 100: 48–59.

Rogers C. R 1957. “The Necessary and Sufficient Conditions of Therapeutic Personality Change.” Journal of Consulting Psychology 21 (2): 95.

Ryder S., and Hospice U. 2018. “Bereavement Support in Scotland.”

Sabra J. B. 2017. “‘I Hate When They Do That!’ Netiquette in Mourning and Memorialization Among Danish Facebook Users.” Journal of Broadcasting & Electronic Media 61 (1): 24–40.

Stroebe M., and Schut H. 1999. “The Dual Process Model of Coping with Bereavement: Rationale and Description.” Death Studies 23 (3): 197–224.

Segal R. M 1984. “Helping Children Express Grief Through Symbolic Communication.” Social Casework65 (10): 590–599.

Warwick Medical School 2020. “U. O. W. The Warwick-Edinburgh Mental Wellbeing Scales – Wemwbs.”

Worden J. W. 2018. Grief Counselling and Grief Therapy: A Handbook for the Mental Health Practitioner. New York, NY: Springer Publishing Company.