

Evaluation of the Chronicle Snapshot Memory Box

“This is going to be a stimulus to something far bigger”

Dr Abigail Webb and Professor Valerie Gladwell

30th April 2025

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DISCLAIMER

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Published by:

University of Suffolk Waterfront Building Ipswich Suffolk
IP4 1QJ

University of Suffolk
Waterfront Building
Ipswich
Suffolk
IP4 1QJ



To cite this report: Webb, A. & Gladwell, V. Evaluation of the Snapshot Memory Box. University of Suffolk. Available at: <https://oars.uos.ac.uk/id/eprint/4941>

EXECUTIVE SUMMARY

The present research evaluation project examined the impact of Chronicle's Snapshot Memory Box on the wellbeing of (i) older populations living with dementia and/or Alzheimer's or identified as being at risk of isolation and/or loneliness, and (ii) loved ones e.g., those who care for, support and/or had gifted a Memory Box.

Mixed methodologies included surveys, focus groups, and one-to-one interviews with users of the Memory Box, their loved ones, and supporters. Overall, findings from the project showed that:

- The majority of Memory Box users find the device to be enjoyable, emotionally impactful, and easy to use- it promotes positive mood, a sense of connection to loved ones through familiar voices, reminds users of shared memories, and stimulates conversation.
- Gifters of Memory Boxes overwhelmingly felt that the Memory Box was a meaningful, intuitive gift that brought emotional comfort and strengthened connections with their loved ones. The device could be used as a conversational stimulant, and/or tool for reassuring loved ones.
- When the Memory Box is used by those living with dementia and/or Alzheimer's, consideration of the extent of cognitive impairment is vital to maximise the benefits of the device; the Memory Box is most impactful for those with early stages of the disease(s).

From our findings, we have proposed the following four recommendations:

1. Improve the accessibility of the Memory Box by enhancing its functional visibility e.g., increasing button size, visible button placement, and volume control.
2. Increase adaptability with the addition of more photograph and audio recording opportunities.
3. Ensure dementia specific adaptations that may make the device more useable and dementia friendly, including those listed under 1, above, and we suggest the trialling of evidence-based dementia friendly features e.g., colour contrast features, device size, and surface textures.
4. Further evaluation of the (i) dementia-friendly device adaptations, and (ii) contexts for application e.g., different user settings and circumstances, could further identify pathways to maximise the benefit of the Memory Box for both older and novel user populations.

The present evaluation project is a detailed investigation of the innovative way in which the Snapshot Memory Box can promote wellbeing in both end users of the device and their loved ones. Together, findings unequivocally show the positive impact of the Memory Box on the social and emotional wellbeing not only of the end users of the device, but also the loved ones with whom it is shared, or indeed those that come together to create and gift it.

Introduction

The Snapshot Memory Box

The Snapshot Memory Box is a unique product that has been developed by Chronicle Digital Storytelling, a company based in Suffolk in the UK (info@chroniclestories.co.uk). The device is an ornately designed photo frame that includes an audio playback feature. The box is rechargeable and allows up to about five minutes of high-quality audio to be played simply by pushing a button. The audio can be a single recording or split into multiple recordings that play with each press of the button. The product is based upon the idea that listening to audio recordings of the familiar voices of loved ones can provide comfort to people – especially to people in care, those at risk of isolation, or individuals with dementia.



Present project

This research project was commissioned by Chronicle, supported by funding from Innovate UK, part of UK Research and Innovation (UKRI), to assess the potential benefits of Chronicle's Snapshot Boxes to support the health and well-being of older people in care and those at risk of isolation and loneliness, including individuals with dementia. The six-month project involved in the creation of 29 Snapshot boxes that were personalised for each recipient with photos and audio recordings provided by family members, friends and carers.

Research participants of the project included (i) gifters of the Memory Box, e.g., those who had designed and gifted a Memory Box to a loved one, (ii) recipients of Memory Boxes, and (iii) supporters of recipients, such as carers and residential care staff. Note that in some cases, gifters were also supporters. Fifty-two percent of Memory Box recipients were nominated by a staff member of a care home or carer, 41% by a family member and 7% were self-nominated. Seventy-nine percent of Memory Box recipients were from Suffolk with the remainder from other areas of the UK. Sixty-two percent lived in a residential care facility or retirement complex, with the remaining 38% living at home. When recipients were nominated for a Memory Box, respondents self-identified the following conditions:

- 59% had dementia
- 31% had Alzheimer's

- 52% were at risk of isolation and loneliness
- 52% had anxiety of confusion
- 14% referenced other conditions including pain, Parkinsons, and hallucinations and frustration

Outline of project workstreams

Review of the published literature

A scoping review was undertaken to capture an overview of published literature regarding the use of digital storytelling for health and wellbeing, to establish (1) the environments in which it is employed for this purpose, (2) its relative efficacy, and (3) areas where its impact shows promise, and potential value given further investigation and empirical investigation.

Surveys

Online surveys were shared with all participants and collected where possible e.g., in many cases, recipients of Memory Boxes were unable to complete a survey. Survey items varied according to the category of respondent e.g., recipient, gifter, gifter-supporter, or supporter.

Survey items included validated statements for agreement ratings used frequently in assessments of user experience, and frameworks for implementation characteristics and technology acceptance (Proctor et al.). Bespoke items unique to the design of the Memory Box and its intended purpose and impact were also included.

Interviews and case studies

Nine semi-structured online interviews were conducted with Memory Box recipients (2), gifters (5) and gifter-supporters (2). Interviews were converted to text transcripts for the purpose of thematic analyses.

Seven case studies are presented in the report to showcase the contexts in which the Memory Box is especially beneficial for users and their loved ones, and to highlight circumstances where its application could have the greatest impact, as well as the areas and/or features that require further adaptation to be user friendly and impactful.

Care staff focus group

An in-person focus group took place with 3 staff members from a residential care facility. Care staff were an activities manager, care staff manager, and carer. All individuals had experience of supporting recipients (residents) who had been gifted a Memory Box, and/or had designed and gifted a Memory Box to recipients (residents). Transcripts underwent the same procedure for thematic analysis as other interview data. Summary of the study cases

Review of the literature

Autobiographical digital storytelling

Storytelling is a universal form of communication. It has been utilised by thousands of generations for the purpose of meaning-making, heritage sharing, and social connection. Digital storytelling (DST) is a contemporary evolution of traditional storytelling that leverages digital forms to create and share narratives using innovative methods. It is rather broadly defined, and in the last two decades has taken on many forms in the published literature. Generally speaking, and for the purpose of the present report, we have adopted the definition of autobiographical digital storytelling; the multisensory combination of images, sounds and narrative to construct a representation specifically of one's lived experiences, for the purpose of autobiographical archiving and/or sharing with an audience (Lambert, 2010; Piquart & Forstmeier, 2012; Stargatt et al., 2022). Digital storytelling offers a certain flexibility and accessibility in terms of creation and sharing potential, that together mean it has interactive and creative capabilities beyond that associated with traditional storytelling.

The value of sharing personal narratives

Sharing lived experiences through DST promotes listeners' empathy with the storyteller, through the description of personal experiences that help portray the important components of one's life story and identity; to share the backstory of who they are and their personal narrative, in a bid to feel understood and recognised by a desired audience (Stargatt et al., 2022). Stories allow audiences temporary access to the inner world of the storyteller, in a way that could be crucial for key stakeholders e.g., victim-survivors and patients, to inform decision making strategies and facilitate guidance by the lived experience of a given population (De Vecchi et al., 2016).

They also offer an opportunity to co-create in shared, communal spaces. For this reason, may be especially valuable to those who have limited access to, but could benefit most from, social participation (Rolbiecki, Washington & Bitsicas, 2021; Hollinda et al., 2023; Zhu, Mahmud & Liu, 2024). Indeed, it is for this reason that DST has been proposed as an effective arts-based research method that can capture the voices and lived experiences of stakeholders and preserve cultural-heritage (Khoshkesht, 2020). Recent literature reviews by Chang and Ahn concluded that processes of DST can facilitate positive mental health particularly in key populations, where those engaged in the creative intervention feel more self-confident, fulfilled and mentally well (Chang & Ahn, 2023; Stargatt et al., 2022). Mazzoli et al., (2024) explains that it is the universal process in which participants investigate their own experiences, write them into creation to share with others, that encapsulates the omnipresent experience of sharing to be heard and have our experiences validated.

Psychosocial benefits of DST are discussed in the following sub-sections. Studies have been selected according to their relevance to the current topic: the way in which DST can be used to facilitate health and wellbeing across various populations. Please note that many of the sub-sections and their themes significantly overlap with one another. They have been presented separately, where possible for clarity, and in no particular order.

Therapeutic intervention strategies

There are many instances where DST has been embedded within therapeutic practices, with positive effects. Ferrari et al. (2015) showed that workshops using DST encouraged self-expression and articulation of emotions, unique individual journeys, and memories, in a way that reconciled patients' own understanding and ownership of their experiences. Such reconciliation is an important part of the therapeutic process, according to the authors, because the deliberative meaning-making and thought processing required by DST creation can help an individual to integrate past experiences and emotional associations. Moreover, the process of using these methods through DST can help not only an individual's emotional healing process but do so in a way that creates something that is long-lasting and sharable (Rolbiecki et al., 2021). For example, Rolbiecki and others (2021) showed DST to have an important role to play for coping with grief; workshops designed to promote the processing, verbalisation and communication of grief experiences helped participants to (1) organise their thoughts and emotions surrounding the loss through meaning-making, (2) share their experiences creatively in a communal and creative space, and (3) left them with a tangible and long-lasting creation serving as a product of their own self-narrative (Rolbiecki, Washington & Bitsicas, 2021). Similarly, for individuals recovering from cancer, self-rating scores for resilience, self-efficacy and quality of life all improved after participation in a creative intervention programme where participants created narrative theme videos about their individual recovery journeys (Zhu et al., 2024). The re-telling of such personal experiences with cancer using creative methodologies and personal effects is considered to be a key aspect of meaning-making an experience processing that positions DST well as a therapeutic technique (Zhu et al., 2024; Laing et al., 2019). Moreover, it has also been described as a cost-effective therapeutic strategy, promoting individuals' mental health via creative endeavours that promote self-efficacy and fulfilment through self-expression and meaningful activity (Chang & Ahn, 2023).

On a related topic, Pu et al. (2022) argue that the qualitative nature of DST makes it a rich and efficient method for capturing patient experiences that are beneficial for both therapeutic and professional development uses. Compared to large-scale data collection, it requires fewer human resources to capture key aspects of the patient experience and as such should at least be adopted as a complementary technique to standard modes of data collection. Moreover, its strong therapeutic potential can facilitate opportunities for peer-support among participants, for example, through the sharing of coping strategies (De Vecchi et al., 2016; Wexler et al., 2013). An example includes the African, Caribbean, and European Pathways Project, where DST was incorporated into narrative and art-based therapeutic techniques to bring individuals together to process similar, emotionally laden experiences. Together, participants created digital stories that mapped their journeys from their first experience of psychosis to the start of their first intervention treatment. A similar community project exploring the impact of endometriosis produced similar outcomes. Stories of lived experiences were co-created through collaborative workshops, where participants reported appreciation of newfound connections and peer-support derived from open conversations surrounding often taboo topics and the emotional healing that followed (Howard et al., 2023). Such co-creation of personal narratives through collective reflection in a safe environment provides storytellers with a sense of ownership of their

experiences and personal empowerment through the sharing of these stories. (Ferrari et al., 2015; Howard et al., 2023).

Promoting intergenerational relationships

Digital storytelling is a unique opportunity for loved ones to connect through a shared activity, particularly in terms of archiving and presenting the voice and image of the storyteller for future generations (Xu et al., 2023). The Digital Life History Project is an example of how DST can be used as a knowledge transfer tool for community dialogue and intergenerational connection: elder learning partners engaged in the programme shared their life stories with university students, offering advice and guidance to younger adults on topics such as knowing themselves, the importance of slowing down and gaining control and confidence over certain aspects of their lives. Elder participants shared their experiences of relationships and careers, and a sense of history not experienced by students. Students, as listeners of elders' stories, reported new interests in historical events and their own grandparents' life stories. The process of matching the two generations promoted a new understanding of aging for students, and perceived quality of the interpersonal connections with their own family members (Loe, 2013). In a similar project by Hewson et al. (2015), social work students supported older adults to create digital stories on the theme of "Stories of Home". The experience was delivered over a 3-day workshop and required students to facilitate the development of personal narratives but also recognise individual needs and facilitation skills that would ultimately provide them with insight into the experience of older adults. Feedback from both students and older adults was positive, highlighting the value that DST can give to intergenerational learning by way of sharing experiences within the context of healthcare education. For this reason, Sljivic et al. (2021) explain that DST can be used as a tool for challenging societal assumptions and stereotypes surrounding aging, whereby empathy is considered the underlying driver that ultimately reduces negative social perceptions between generations; an effect that is particularly pronounced through DST when experiences are shared through the voice and tone of the storyteller themselves.

Digital narratives as healthcare education tools

There are many instances where DST has been utilised as a pedagogical tool in healthcare education, namely within undergraduate nursing contexts (Moreau et al., 2018). Moreau et al., (2018) explain that this is likely because reflective and empathic skill development are key components of healthcare professional development. Digital storytelling can help students to develop and hone these skills within a clinically specific case, in a uniquely creative and collaborative environment. Moreover, the centralisation of patient experience provides a window into the first-hand experience of a given clinical population, for example, by facilitating students' preparedness of supporting patients with mental health illnesses. This learning technique can enhance student nurses' scores on post-DST assessments (DeLenardo et al., 2019).

Similarly, Sondag (2021) showed that reflective features of DST supported students' understanding of their identity as occupational therapists, through the unification of professional practice and personal values. The technique was perceived by trainee students as a positive, complementary tool to traditional learning methods

The method is also particularly useful for niche, or clinically specific aspects of healthcare. For example, for trainee palliative care nurses, DST was an opportunity for professionals to re-conceptualise real-life experiences of death and gain a positive re-framing and understanding of their own role within the process (Glassman & Lewis, 2024). In neonatal education, DST has been used to enhance children's nurses' empathy with the emotional distress experienced by some parents of unwell and/or premature babies. Such highly sensitive and emotive circumstances require salient opportunities for empathic engagement with, and DST is an effective strategy to achieve this (Pretty, 2021).

Public health campaigns

Digital storytelling offers a novel medium through which public health information can be communicated and shared with marginalised populations. Education interventions that embed DST show improved health outcomes related to diabetes and hypertension (Bertera, 2014), and the promotion of vaccine uptake in vulnerable and vaccine-hesitant populations through the countering of misinformation (Chen et al., 2023; Maragh-Bass et al. 2022). Self-management programmes that utilise DST also demonstrate positive changes in behavioural intentions related to healthy living (Carlson, et al., 2021). Similarly, Cueva et al. (2015) showed that digital stories created and shared within Alaska's rural Community Health Aide Program promoted the dissemination of health-focused messages within close social networks; participants found the communication of health information through DST to an emotionally engaging "springboard" for starting topical conversations. The authors argue that the inclusion of public voices helped to ensure the program was culturally-informed, thereby maximising its likeability, cultural appropriateness and potential uptake as a health promotion model.

Tusi and Starecheski (2018) explain that the effectiveness of public health campaigns using DST occur because the technique places the affected populations at the centre of discussion(s), in a way that promotes public trust and opportunities for engagement. Such patient-centred information about health experiences encourages health education in a way that promotes not just the centrality but also the *involvement* of affected and/or marginalised voices. It is for this reason that Fiddian-Green et al. (2023) rate DST as a dialectical method via which affected populations can effectively and *collaboratively* identify solutions to address health inequities alongside healthcare professionals. As is outlined here, this approach appears to be crucial for effective public health campaigns.

Alongside the unique opportunity that DST allows for capturing and sharing voices and lived experience, DST is also praised for its simplicity as an efficient and digestible mode of communication that is essential for any public health campaign (Pu et al., 2022). For example, it has been effectively used as a documentation strategy to promote live kidney donation. Ho et al. (2022) used DST to capture experiences of living donors and kidney recipients as they both progressed on the journey to transplant, including their respective emotional states, perceived quality of life, and relationship to each other, as well as the Live Donation Storytelling Project that captured both lived experiences and promoted peer support through the sharing of advice and guidance by both parties (Davis et al., 2022). Public health campaigns to boost uptake of colorectal cancer screening within a hard-to-reach population (Latinx

Church) also showed that DST appeared to positively impact public preconceptions and intentions surrounding screening intervention. Participants were especially impacted by the way in which DST integrated stories shared of those with whom they respected and could relate to (Gomez, et al., 2023)

Reducing social stigma and stereotypes

The 'Life and Love with HIV' project adopted arts-based methods including DST to share lived experiences of women living with HIV, to promote education surrounding sex positivity informed by lived experience, ultimately to challenge and deconstruct negative social portrays and stigmatisation (Carter et al., 2021). Similarly, Paterno et al., (2019) showed that digital stories created by mothers with history of a substance abuse disorder helped peers on their own recovery journeys to seek understanding through pregnancy-specific peer support. Sikapa et al. (2014) argue that the non-didactic nature of DST empowers marginalised populations to challenge and inform the dominant narrative. Moreover, the technique offers storytellers a potentially therapeutic opportunity to process and share their own self-identity and experiences, in a way that will ultimately be used to promote positive social change (Laranjeira et al 2021).

Gruson-Wood et al. (2022) showed DST to be an effective method by which 2SLGBTQI+ parents could share their experiences of parenting in a way that was guided by self-advocacy and autonomy, as an informative antidote to homophobic and colonial social norms. A similar strategy was used by Vaughn and Leon (2021), where adolescents of different identities and backgrounds created their own DST for the purpose of sharing their digital narrative with peers. Zaretsky et al. (2022) used a similar DST initiative whose purpose was to portray the lived experience of individuals living with bipolar disorder, to enhance empathy within psychiatric education and promote compassionate approach to psychiatric care. The initiative received positive participant feedback and digital stories were utilised in psychiatric education, the process of which humanised the mental health condition. Similarly, within forensic mental health, through the Digital Byes Project service users created digital narratives surrounding their identity, recovery journey and hope for the future, specifically to be shared with their social support worker. Digital stories nurtured positive self-identity and self-concept beyond their identity as a service user (Lambert et al., 2023).

Relationships between caregivers and clients

Digital storytelling enables a deeper insight into, and appreciation of, individuals' unique histories (Subramamiam & Woods, 2016), promotes a greater knowledge of residents' identities (Bhar et al., 2022) and provides points of discussion between both service user and caregiver. It is perhaps for this reason that much of the published literature explores the use of DST within user populations most at risk of memory loss, and the psychological comorbidities accompany these, such as depression, loneliness, and anxiety. Hollinda et al., (2023), for example, explain that when caregivers and service users co-create digital stories and narratives *together*, the facilitator of the story (e.g., the caregiver) becomes the "weaver" of the service user's story. Indeed, when people undertake this process together, interpersonal relationships and individuals' sense of belonging are both stronger (Chang & Ahn,

2023). For the relationship between caregiver and service user, ratings of perceived warmth and conflict also improve, demonstrating the function of DST as a social-emotional bonding tool (Subramaniam & Woods, 2016).

Reminiscence based digital storytelling

Reminiscence-based DST (rbDST) refers to the specific application of DST within contexts such as dementia and/or Alzheimer's, specifically the re-telling and sharing of past experiences using digital media e.g., audible, and visual stimuli. This approach is congruent with that of person-centred care, as it aims to capture, preserve, and share an individual's life experiences through multimedia forms, typically photograph, video and/or voice capture. For this reason, the published literature suggests that the method is becoming an increasingly popular technique to support those living with cognitive decline, through the stimulation of reminiscence and conversation.

Published literature suggests an impact of DST on memory capability, particularly that of long-term, autobiographical events. Evidence includes improvements in scores on standardised memory tests following engagement with DST, particularly in terms of an individual's autobiographical memory for factual information (Stargatt et al., 2022; Subramaniam and woods 2016). Indeed, a recent review by Xu et al. (2023) concluded from 10 published studies that reminiscence-based digital storytelling is beneficial for older adults because it has a unique capacity to stimulate the resurrection of positive memories and evoke positive feelings as a result. For people living with dementia and Alzheimer's, DST may thus have a special ability to help an individual re-trace thought processes related to their identity, self-esteem and memories of fond events.

There are several examples across varied contexts where rbDST has demonstrable benefits. One such example includes the use of digital photographic diaries, which are facilitatory in helping people living with dementia to recall past events and stimulate meaningful conversation topics with loved ones (Karlsson et al., 2014). Another form of rbDST is the creation of multimedia biographies, where individuals living with Alzheimer's and/or cognitive impairment are supported to create personal narratives about their lives that incorporated images and videos. In a study by Damianakis et al., (2009), story themes often included childhood events, early memories of family, parenthood and careers, cherished memories of loved ones, and loss. Participants shaped the structure of their story lines with support from family members and researchers. Both storytellers and their loved ones reported an immediate effect of the rbDST whereby stories stimulated connection through conversation of shared memories and personal histories, referred to by the authors as a form of "reengagement" with the storyteller's identity prior to the impact of the disease. Loved ones and supporters of the storyteller find the activity to be an emotionally engaging and meaningful event specifically referred to by authors as the preservation of the "family legacy" afford by the digitisation of personal narratives. Indeed, this is a consistently reported benefit of rbDST (Hausknechy, Vanch-Orosco & Kaufman, 2018; Loe, 2013). Authors also suggest the technique has the *potential* to limit behavioural difficulties associated with the progression of cognitive impairment (Damianakis et al., 2009). rbDST has also been applied in workshop settings. Stenhouse et al. (2013) found that rbDST workshops for individuals with early-stage dementia promoted meaningful relationships and social connection, again highlighting the impact on the storyteller's self-expression through digital storytelling. The process of co-creation, or

supported creation of stories, also helped to promote the quality of relationships through skill sharing and development. Further, they fostered a sense of personal achievement. Critten & Kucirkova (2017) explored the use of the mobile phone application, “Our Story”, that enabled users living with dementia to create personalised stories using multimedia and audio recordings. Storytellers reported enjoyment of the experience and a positive sense of self-esteem and identity and confidence, and loved ones agreed on the importance and value afforded by conversations and discussions generated by the process. Similarly, the Storytelling mobile phone application was designed to help individuals living with dementia preserve and share their life stories. Prompts for multiple topics encourage users to become storytellers, eliciting long-term memories that they can create as a keepsake and as a creation to share with loved ones. Munk et al. (2025) concluded that engagement with the application reinforced participants’ sense of self, and supported the recall of events previously forgotten, suggesting the potential benefit of such a strategy on cognitive capabilities. Moreover, the study also highlighted the impact of the activity for supporters of storytellers, who, as a result of engaging with digital stories, were able to develop a deeper understanding of storytellers’ identity and life story; a key approach for person-centred care.

Finally, although research is limited, and DST can take many forms, existing evidence suggests that familiar voices such as those utilised in DST can play a valuable role in supporting the wellbeing of people living with dementia. Stimulated Presence Therapy (SPT), which involves playing recordings of loved ones offering comforting and reassuring messages, has been shown to reduce anxiety and agitation, where it is often described as being akin to a calming phone call. Other studies show that familiar voices and music help to create a familiar environment, positively impacting mood and distress reduction (Woods & Ashley, 1995; Abrahams et al., 2017). Indeed, organisations such as the Lewy Body Dementia Association and the Alzheimer’s Society also emphasise the importance of familiar stimuli—such as photos, memory books, and songs from earlier life—in promoting calm and emotional comfort for those living with cognitive decline. These findings suggest that DST with integrated voice familiarity components and/or features may be especially effective for individuals with mild cognitive impairment or memory loss, serving as a soothing and emotionally supportive tool. However, to date, the broad definition, and permutations of DST, as well as a lack of studies that have placed a particular focus on the role of voice familiarity, mean that it is difficult to infer from the literature that familiar voices have a special role in DST. The present study is, to our knowledge, the first to explore the impact of this combination on wellbeing in older populations.

Important considerations of using DST

The need for more empirical evidence of its efficacy

While published literature on the topic of digital storytelling is rather abundant, recent reviews have highlighted that much of the published studies disproportionately focus on the content of the stories themselves and the digital curation processes, rather than specific methodology and measures used to assess the efficacy of digital storytelling. A recent review of DST by Tsui and Starecheski (2018) argues that (1) the definition of DST is very broad, and (2) currently there are only a limited number of systematic studies of the effects associated with DST across what are very different contexts and

applications. The authors argue that more evaluation studies must be undertaken to fully realise the impact and application of DST, as well as the areas in which its impact is limited. This argument is supported by other researchers, for example, within healthcare pedagogy (Mojtahedzadeh et al., 2021), and within older populations where it is used as a reminiscence tool (Munk et al., 2025).

Sensitive application

Researchers have highlighted the importance of considering the nature of the digital story itself, including the identity of the storyteller and the purpose of the story itself. For example, DST used for reflective and meaning-making purposes e.g., for therapeutic purposes, inherently requires the re-visitation of negative life events and memories. This is often referred to as re-traumatisation, whereby an individual must re-live the memory of an experience in order to process and share it (Chang & Ahn, 2023). This is also true within the context of dementia care, on the basis that age related cognitive impairment and decline occur earlier for those who have previously experienced traumatic experiences (Craftman et al., 2020). Indeed, both Damianakis et al., (2009) and Critten and Kucirkova (2017) highlighted that although rbDST was capable of eliciting positive emotions and memories for many participants living with Alzheimer's, the response was also ambivalent, in that the activity was also capable of stirring feelings of sadness. Moreover, Critten and Kucirkova (2017) argue that it is important to consider whether the intended use of the digital story is to maintain calmness and relaxation for the end user, or, to stimulate conversation engagement through prompts; design strategies of rbDST and expectations around its efficacy should therefore be informed by its intended use.

Accessibility

DST methods, because of the way in which they utilise and combine multimedia information, naturally require certain cognitive and technological abilities, both in terms of the creation of the digital story itself and its utilisation in any given form (Reyhan & Dağlı, 2024). In this sense, the approach and design of the individual DST case may need to be decided based on idiosyncrasy of the storyteller and intended audience (Bhar et al., 2022). Creating a story, especially with a storyteller who requires additional support due to cognitive impairment, can be difficult for some families in terms of both time logistics and technology use (Damianakis et al., 2009; Critten & Kucirkova (2017)). It may therefore be that the potential for rbDST to positively impact an individual is likely determined by its relative accessibility. For example, participants using, with support, mobile application technologies to create their digital stories were overall positive, though the specific abilities and progression of dementia in each of the 3 case studies were seemingly capable/positive enough to allow them to participate in the study. Such case studies thus do not reflect the use of rbDST in more advanced, progressive cases of cognitive decline (Critten & Kucirkova (2017))

In summary

DST is a fast-growing area of research. Visual and auditory media amplify the storyteller's experience in a way that enables them to share their personal narrative in a unique, personal way. Findings from the literature demonstrate the potential of DST to enhance wellbeing through reflective and meaning-making processes that promote

self-expression, recall of autobiographical events, and emotional processing. In communal settings, DST can be especially powerful. It encourages empathy and co-creation of stories through social participation and facilitates opportunities for peer-support. When shared with loved ones, DST can bring individuals together over memories of a shared life and encourage feelings of closeness and stimulate conversations that last beyond the initial activity.

A specific area of the research focuses on rbDST, which appears to be especially beneficial for people living with cognitive impairment through, for example, dementia and/or Alzheimer's. It is a technique, or activity, that offers person-centred approach to memory recall, emotional wellbeing, and social connection. The revisiting and sharing of personal life events help individuals to access long-term memories, which in turn encourages positive emotions and self-identity, and importantly, is invaluable for meaningful conversations with loved ones. The flexibility of digital stories allows them to include memory or conversational prompts that strengthen relationships and can reduce feelings of isolation. These experiences are beneficial for both the storyteller and their audience, as both are often reminded of the identity of the storyteller prior to dementia and/or Alzheimer's disease. Moreover, the digital stories created can be preserved as long-lasting artefacts that preserve family history.

There are multiple contexts in which rbDST can be implemented, including workshops and mobile phone applications. Flexible strategies provide opportunities for loved ones and supporters of storytellers to be involved during the story creation process. For supporters e.g., carers and nurses, this process can provide valuable insights into the lives and experiences of storytellers. However, there are several possible limitations and important considerations to ensure effective and ethical application of rbDST: (1) the definition and use of the technique is broad, as well as the contexts in which it is used, such that it is important to develop a more rigorous, context-specific understanding of how and where rbDST is most effective, (2) rbDST, although mostly effective, has the potential to cause mixed emotional responses, which raises ethical concerns about the design and delivery of rbDST as an intervention, such that one should consider whether its purpose is to soothe or stimulate conversation, and tailor their approach accordingly, and (3) rbDST often requires a degree of cognitive and technological capability for story creation and sharing, which can limit its accessibility and impact, such that its design and application should be considerate of these factors.

Recipients of the Snapshot Memory Box: Findings from surveys

Recipient surveys were completed by 12 respondents who had been gifted a Memory Box by a loved one, including 9 women and 3 men, aged 60-69 (n=1), 70-79 (n=5) or 80+ years (n=6).

Useability and aesthetics

Respondents were asked 3 questions about the useability of the Memory box: (1) the ease of *learning* to use the device, (2) ease of *actual* use, and (3) ease of *interaction* including turning it on and off, charging it etc. Learning to use the Memory Box and interacting with the Memory Box was reported as easy by most respondents (75% and 67%, respectively), see Figure 2. All respondents agreed that the weight of the device itself was “about right”. The ability to turn the device on and off independently was noted as an issue, where in some cases recipients who had cognitive impairments e.g., dementia or Alzheimer’s were either unable to active the device themselves or required prompting. Text instructions on the back of the device were also described as being rather small. See below for suggested improvements.

The appearance of the Memory Box was enjoyed by the majority of respondents (91%), who also agreed that the device appeared to be well-made (91%), see Figure 2.

Regarding the relative importance of audio and photographic features of the Memory Box, respondents were asked which of the two they felt were most important for their own personal device. Figure 3 shows that respondents were most likely to feel that either both features were *equally* important (n=5), or that sound was the most important feature (n=5).

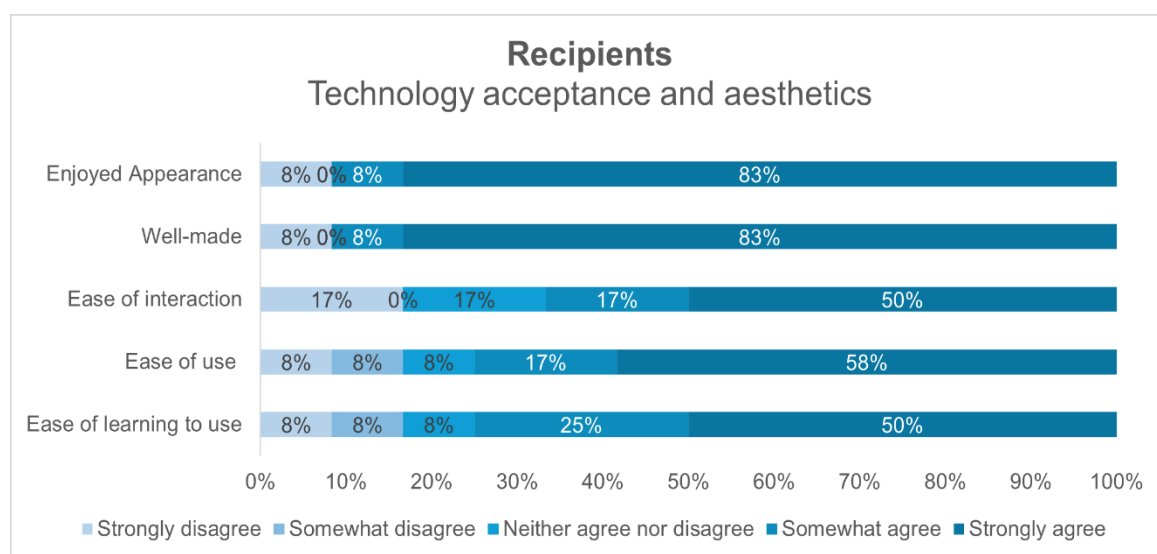


Figure 2. (above) Responses to statements regarding useability (technology acceptance) and aesthetic qualities of Memory Box, according to recipients.

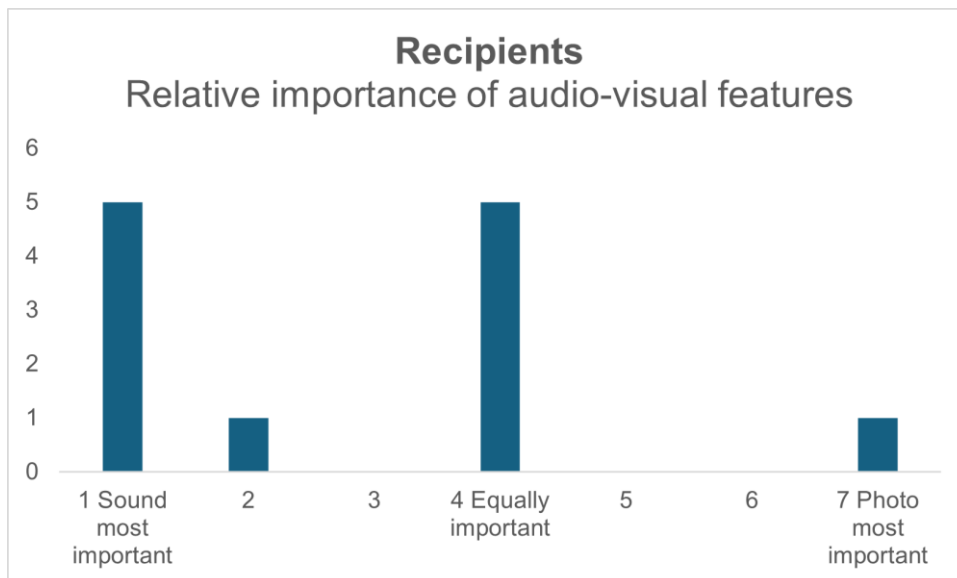


Figure 3. (above) Relative importance of audio and visual properties of the Memory Box, according to recipients.

Social and emotional impact: Benefits for user and potential applications

Respondents were asked to rate their agreement with 4 statements reflecting the emotional and social impact of using the Memory Box, including (1) enjoyment during use, (2) whether use reminded them of positive things e.g., fond memories, loved ones and experiences etc., (3) if using the device helped them to feel calm and/or relaxed, and (4) if using the device gave them a sense of connection to their family and/or friends. Eighty-three percent of respondents reported overall enjoyment of using the Memory Box, and for most, using the device reminded them of positive memories (83%), helped them to feel calm and/or relaxed (67%) and promoted a feeling of connection to their friends and/or family members (86%). Responses are shown in Figure 4.

Respondents were also asked whether they felt that the Memory Box (1) could serve a beneficial purpose for wellbeing, (2) help people to feel closer to each other, (3) be a meaningful gift, and (4) could be recommended to others. Most respondents considered the Memory Box to be a meaningful gift to others (84%), promote close relationships (84%) and would recommend it to others (84%). Eighty-two percent agreed that the Memory Box was beneficial for wellbeing. A breakdown of responses is shown in Figure 5.

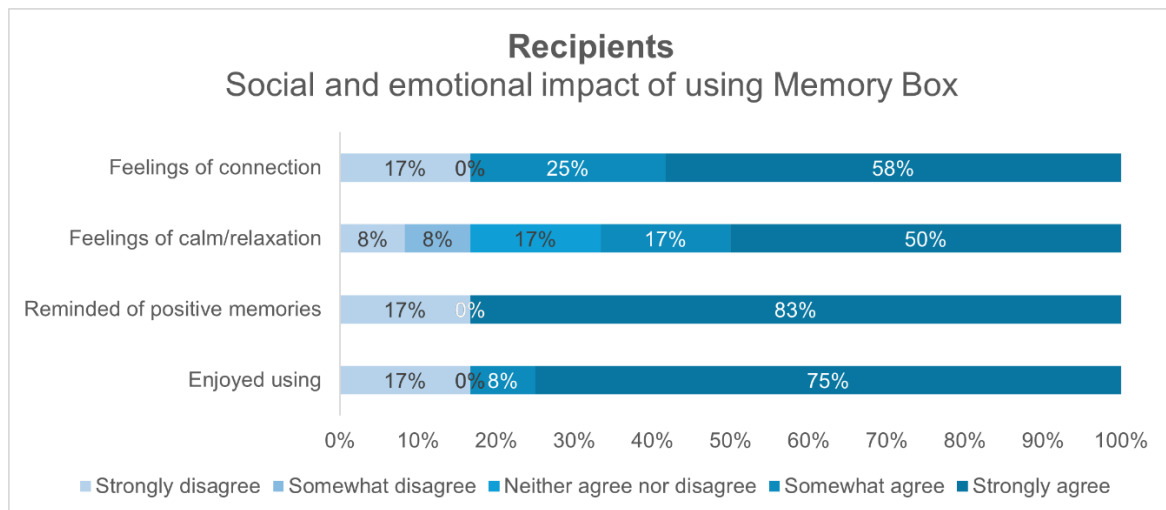


Figure 4. (above) Responses to statements regarding emotional and social impact of using the Memory Box, according to recipients.

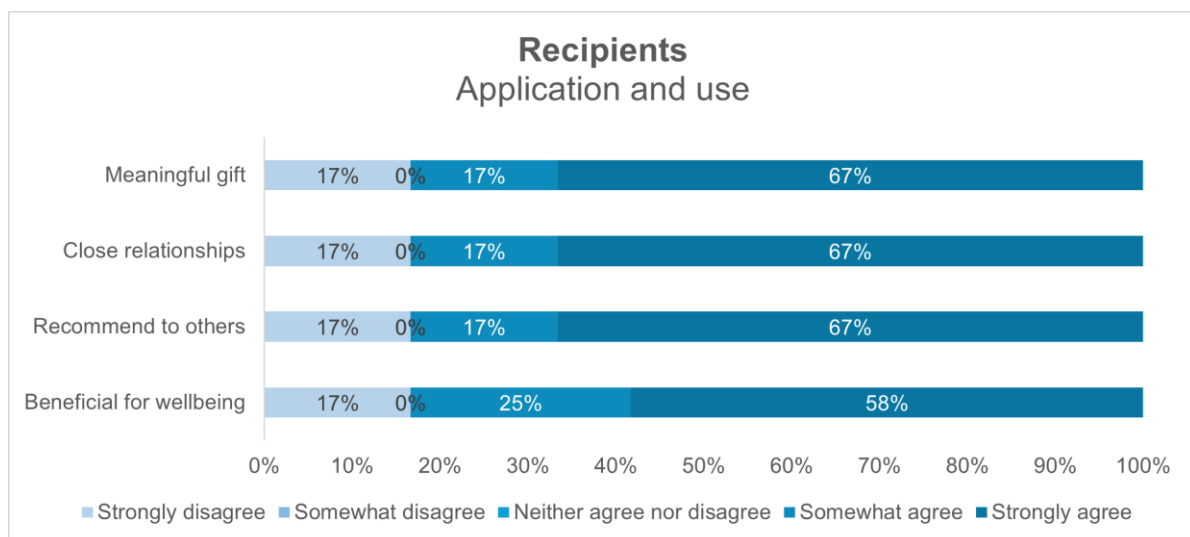


Figure 5. (above) Responses to statements regarding the use and benefit of the Memory Box for others, according to recipients.

What do recipients of the Memory Box enjoy most about the device and experience

When asked what they enjoyed most about the Memory Box, including how it made them feel during use, recipients frequently reported that a positive impact on their mood. Feelings of comfort and/or ease as a result of hearing a loved one's voice was particularly important, where some indicated that the quality of the audio recordings were particularly helpful for this. For example, "hearing loved ones", "hearing my daughter", "listening to them" were frequent comments, as well as the way in which these recordings helped recipients to feel closer, or more connected to, their loved ones. Reminders of positive and shared memories were also referenced, particularly

those which had been forgotten and served as triggers for engaging and enjoyable conversations:

“It makes me feel warm inside. I feel as though everyone is there with me in the room and that we are reliving the memories together. I love it.”

“It brings me closer to family feeling I am more connected”

“Brought back happy memories- the children had thought about memories that made them happy and hearing their voices so clearly brought them to life”

“Hearing the voices so clearly and remembering the happy times together”

“It opened up conversation after listening to it. It’s nice to go down memory lane”

“Listening to my daughter and being reminded of lots of wonderful memories”

“It makes me feel warm inside. I feel as though everyone is there with me in the room and that we are reliving the memories together. I love it.”

“It brings me closer to family feeling I am more connected”

Future: Planned use and suggestions for improvement according to recipients of the Memory Box

Most surveyed recipients of a Memory Box reported using their device either every day (43%) or very often (33%). Expectations for the frequency of future use were generally slightly lower than current use. For example, while 43% of recipients reported having used their Memory Box every day, only 33% of respondents expected to use it every day in the future. However, while 33% of recipients were using the

Memory Box ‘very often’ at the time of the study, this increased to 58% when asked about their planned future use. Figure 6 shows that overall, recipients of the Memory Box appear to be confident that they will use their Memory Box more often in the future.

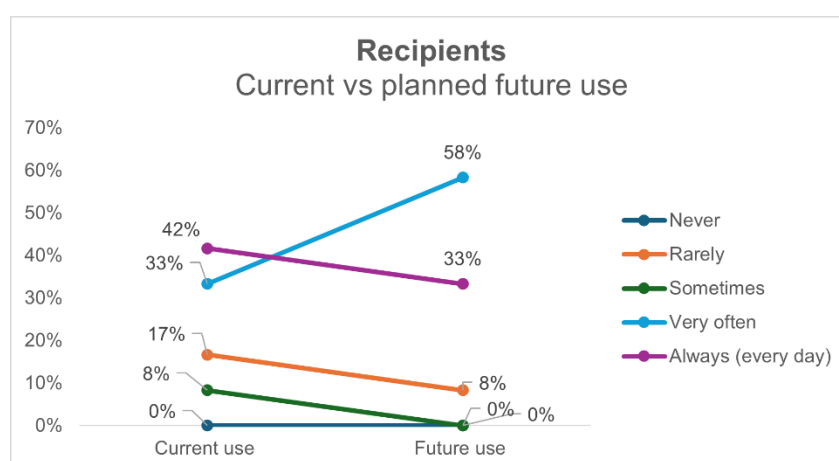


Figure 6. (above) Current versus predicted future use of the Memory Box, according to recipients. Percentages show how often devices are used by recipients at the time of the study, compared to their planned future use.

When asked what could be improved about the device, several respondents

had little-to-no feedback regarding improvements to the Memory Box. A summary of suggestions for improvement are outlined below:

- **Power switch.** Some respondents found the power switch either difficult to locate or turn on. Suggestions either included making the power button more visible by size and/or location e.g., so that it is larger, and not located on the top of the box. One suggestion also included a trigger feature whereby, for example, audio onset would be elicited either by picking up the box or removal of its lid.
- **Updatable media.** Some respondents said that they would like to be able to update the photographs on the box and/or the audio recordings. One suggestion included the exchange of intricate design around the perimeter of the box with more opportunity for a greater number of photographs.
- **Volume control.** Some respondents did not enjoy the inability to adjust the volume.

Gifters of the Snapshot Memory Box: Findings from surveys

Note: In this section, to reduce repetition, we have combined gifter-only and gifter-supporter feedback for elements of the survey *not* unique to the Supporter, including the following: useability, aesthetics,

This constituted survey responses from 28 gifters of a Memory Box; 20 gifter-only respondents, 14 gifters included in the present study and 6 pre-existing customers of Chronicle, and 8 gifter-supporters included in the present study. Of 28 gifters, 21 were women and 7 were men, aged between 25 and 80+.

Useability and aesthetics

For gifters of the Memory Box, learning to use and interact with the device was reported as easy by most (89% and 86%, respectively), see Figure 7. All 28 gifters agreed that the weight of the device itself was “about right”. Size and visibility of buttons were highlighted as a challenge by several respondents, where some felt that it was not clear where buttons were and highlighted that this issue might be especially difficult for individuals with limited hand dexterity and/or eyesight. The lid of the box was also noted by two respondents as being difficult to remove. One individual had difficulty charging the Memory Box and suggested that some clear instructions for users with limited technological confidence might be beneficial. See section below for a more detailed list of improvements according to gifters.

The appearance of the Memory Box was enjoyed by all respondents, who also agreed that the device appeared to be well-made, see Figure 8.

Regarding the relative importance of audio and photographic features of the Memory Box, Figure 9 shows that gifters were most likely to feel that either both features were *equally* important (n=14), or that sound was the most important feature (n=13). Only one gifter felt that the photograph was the most important feature.

Social and emotional impact: Gifter experience and potential applications

Of 28 gifters of the Memory Box, almost all reported that their loved one enjoyed the gift of a Memory Box (92%). The majority also agreed that the process of creating and gifting the device helped them to feel connected to the loved one they were gifting it to (80%), and around two thirds said that it brought them a sense of relief, comfort or wellbeing. (68%). These findings are shown in Figure 9.

Gifters were also asked whether they felt that the Memory Box (1) could serve a beneficial purpose for wellbeing, (2) help people to feel closer to each other, (3) be a meaningful gift, and (4) could be recommended to others. Almost all gifters considered the Memory Box to be a meaningful gift to others (96%), and most felt that that the device could promote close relationships (86%) and would recommend it to others

(89%). Eighty-two percent agreed that the Memory Box was beneficial for wellbeing. A breakdown of responses is shown in Figure 10.

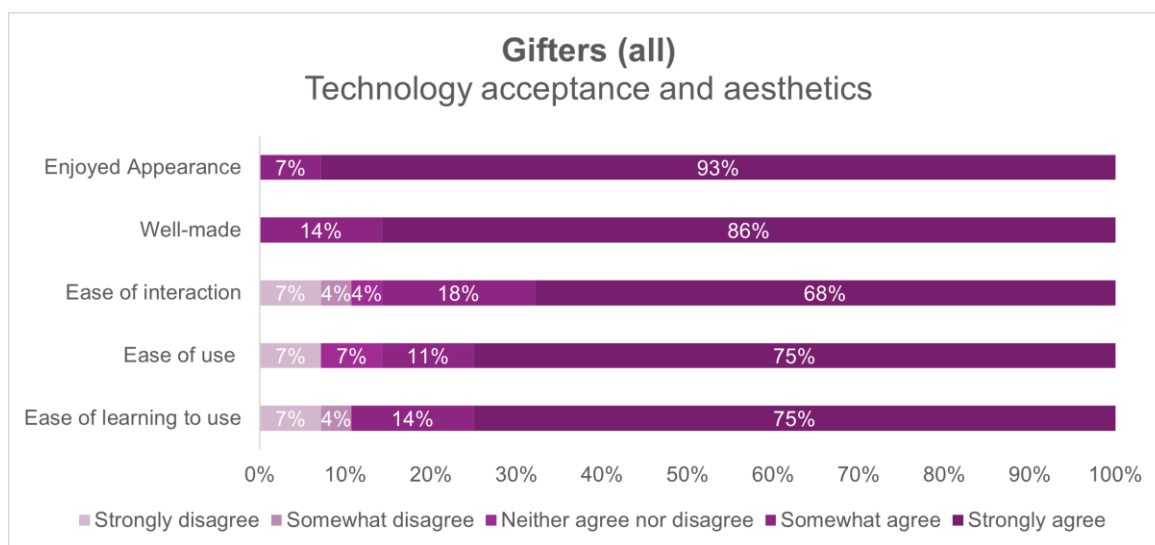


Figure 7. (above) Responses to statements regarding useability (technology acceptance) and aesthetic qualities of Memory Box, according to gifters.

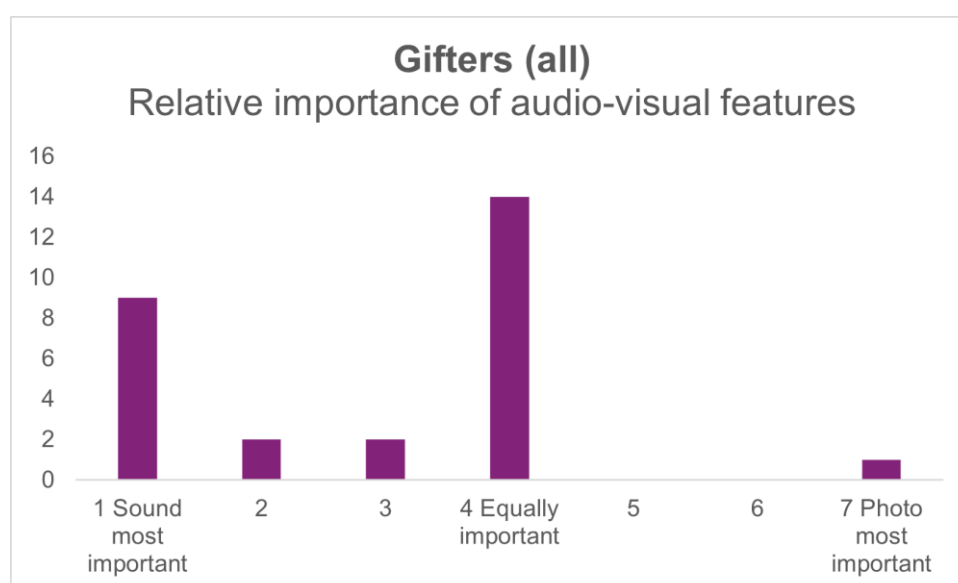


Figure 8. (right) Relative importance of audio and visual properties of the Memory Box, according to gifters.

What do gifters of the Memory Box enjoy most about the experience of creating and gifting a device to a loved one?

When asked about the significance of, and what they liked most about the Memory Box, gifters were overwhelmingly positive. Many described it as an emotionally meaningful experience, and the shared joy of being able to share the Memory Box with a loved one who had dementia; Memory Boxes were described as tools to capture, share and cherish memories, to comfort loved ones in the absence of family

and/or friends e.g., those living in residential care homes, and several reported that their loved ones shared positive tears of joy. The appearance was also highlighted as an enjoyable feature, including the quality, size and ornamental value, as well as the clarity and quality of the audio recording. A selection of feedback from gifters' surveys are listed below:

"My wife was clearly delighted with the Memory Box and would reminisce with the memories that her children had recorded- almost reliving those memories"

"[Mother] absolutely loved it and said it made her really happy. For my mum to show that sort of emotion is a lot. My brother messaged me that evening saying it has made her the happiest she's been in a long time. I think also it gave us other things to talk about as we discussed the people who had sent her the messages and she loved the poems. My mum said that 'everyone should have one of these'"

"[Grandmother] talks about the people speaking and joins in with the songs"

"The audio from the box makes [recipient's] face light up on her down days when family are not visiting"

"It's a wonderful gift that can give reassurance to loved ones. To be able to sit down and listen to someone who is close to you via a recording, about happy memories, such a wonderful item and means such a lot"

"[Memory Box is] a fabulous tool for initiating conversations and stimulating memories. It can be a great shared experience whilst also a very meaningful means of personal recollection"

"The ability to couple a sound with the image was the main thing I was looking for in a gift. It was nice and clear, loud enough to hear comfortably."

"The inputted audio, which is unlike most products on the market which typically rely on recording something live"

Suggestions for improvement according to gifters of the Memory Box

The most common recommendation for improvement according to gifters of the Memory Box was to make certain features more user friendly. This included a larger photograph, for individuals with limited eyesight, and similarly, increasing the size of power buttons and moving their locations to be more visible position on the device. Both were highlighted as obstacles which could inhibit use of the device by a user with cognitive impairments and limited eyesight. More information about suggested adaptations is provided below. Below is an overview of suggested improvements according to gifters, listed in order of the frequency that they appeared in comments:

- **User friendly adaptations:**

- Larger buttons placed at location other than the base of the device, to improve visibility
- Increase the size of the photograph
- Include a volume control setting and increase maximum volume
- **Washable material** e.g., for use in sterile environments
- **Instruction manual**
- **Battery status indicator**
- **Adaptable content** e.g., so that the gifter and/or user can update the photograph and audio recording

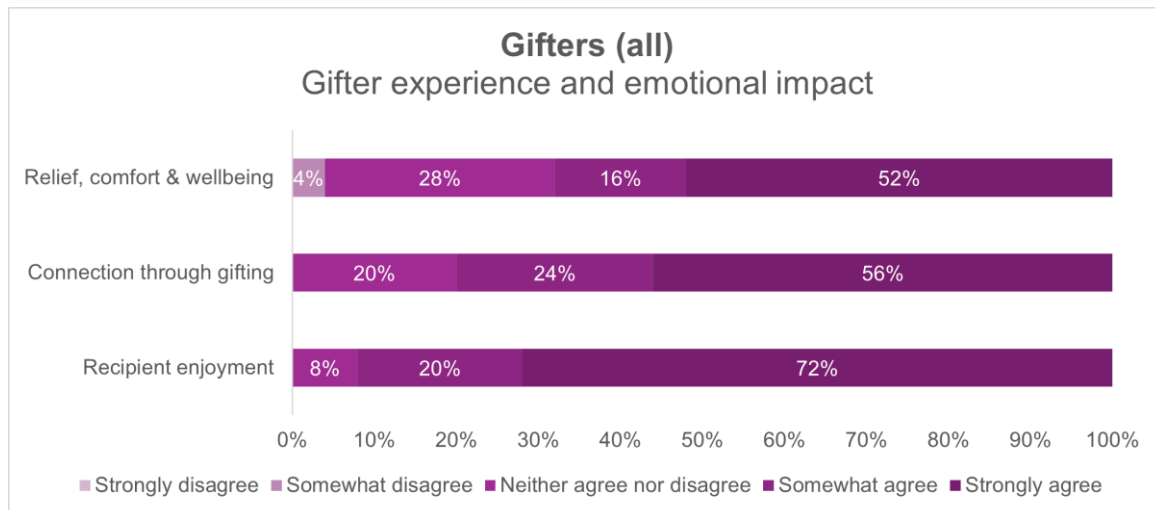


Figure 9. (above) Responses to statements regarding the perceived enjoyment of use of gifters' loved one, connection to their loved one felt through the gifting of a Memory Box, and the sense of relief, comfort or wellbeing afforded by the experience.

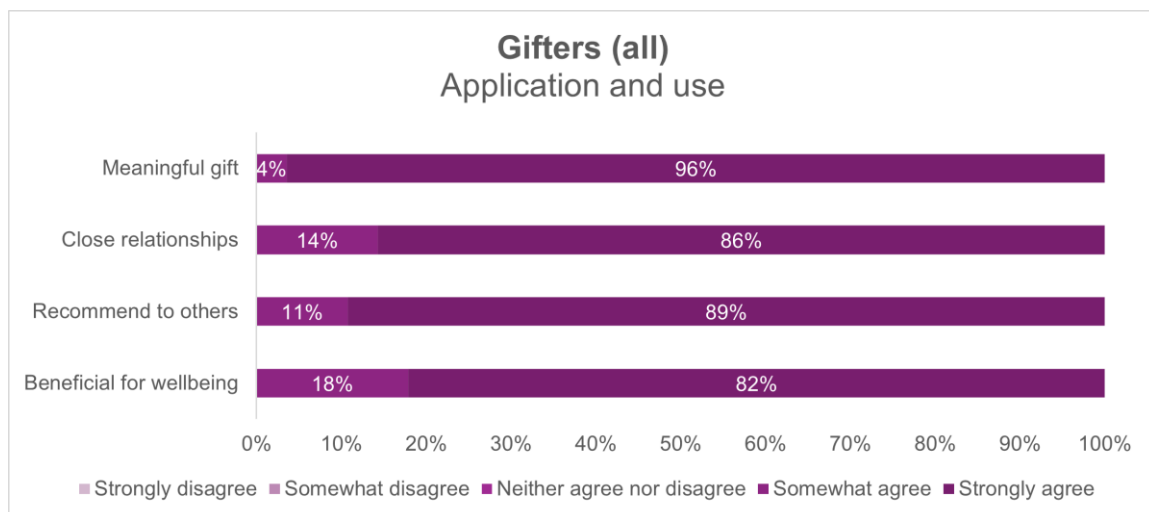


Figure 10. (above) Responses to statements regarding the use and benefit of the Memory Box for others, according to gifters.

Supporters and the Snapshot Memory Box: Findings from surveys

Nine surveys were completed by supporters of individuals who had been gifted a Memory Box. This included 8 women and one man, aged between 25 and 80+ years.

Useability and aesthetics

Supporters were asked the same questions about the usability and physical appearance of the Memory Box. All supporters agreed that the Memory Box was easy to use and interact with. The lid, which was noted as tight-fitting and sometimes difficult to remove, was noted by some supporters as a feature that made interaction with the Memory Box difficult, particularly for users with limited dexterity. Similarly, the volume was noted by one supporter as being too quiet for a user with hearing loss. All supporters enjoyed the appearance of the device and agreed that it was well-made. The weight of the Memory Box was also considered by all supporters to be “about right”. Responses questions are shown in Figure 13.

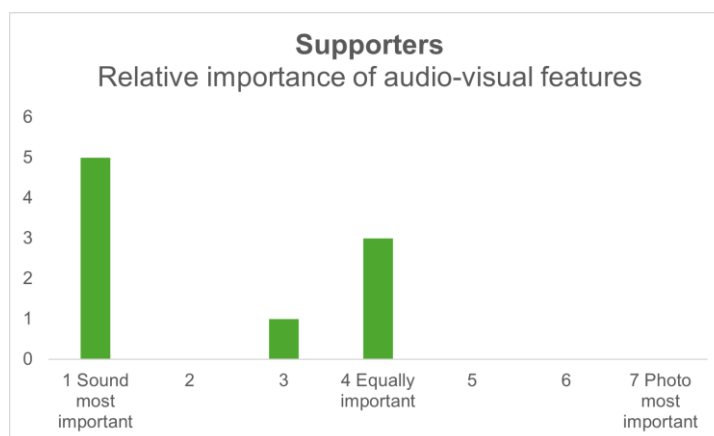


Figure 12. (above) Relative importance of audio and visual properties of the Memory Box, according to supporters.

Regarding the relative importance of audio and photographic features of the Memory Box, Figure 12 shows that supporters were most likely to feel that the audio recording was the most important feature of the device ($n=6$), followed by the combination of the two ($n=3$).

Social and emotional impact: Impact on care and potential applications

Most supporters agreed that the individual's they supported appeared to enjoy using their Memory Boxes (89%). Most supporters also felt that the Memory Box could facilitate a sense of connection between themselves and their clients (77%), and that they were able to develop a greater understanding of their client as a result of seeing and using the Memory Box themselves (78%). See Figure 14.

Regarding potential use and impact of the Memory Box, supporters were overwhelmingly positive; all surveyed supporters strongly agreed that the Memory Box serves a beneficial purpose for wellbeing, can help individuals feel closer to one another, is a meaningful gift, and would recommend it to others.

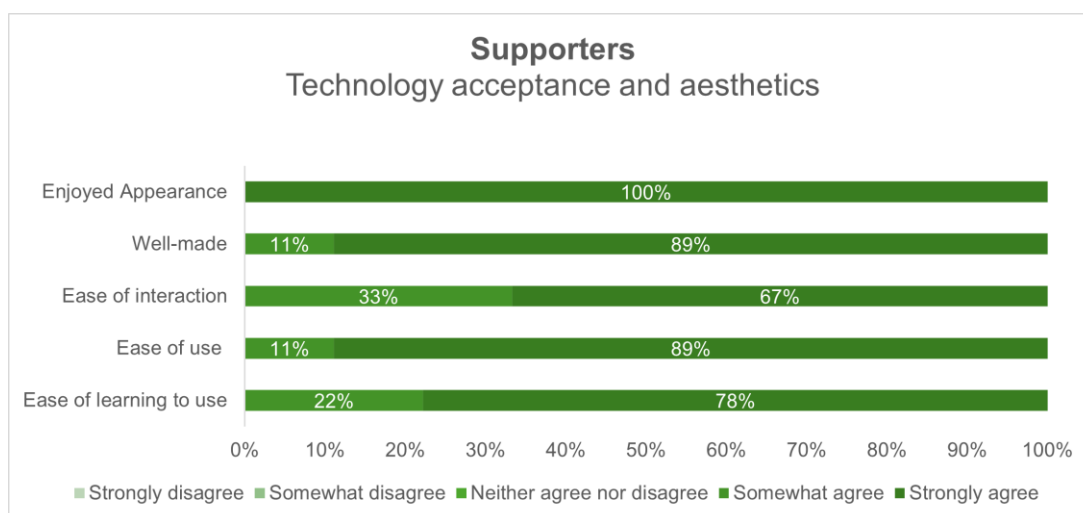


Figure 13. (above) Responses to statements regarding useability (technology acceptance) and aesthetic qualities of Memory Box, according to supporters of Memory Box recipients.

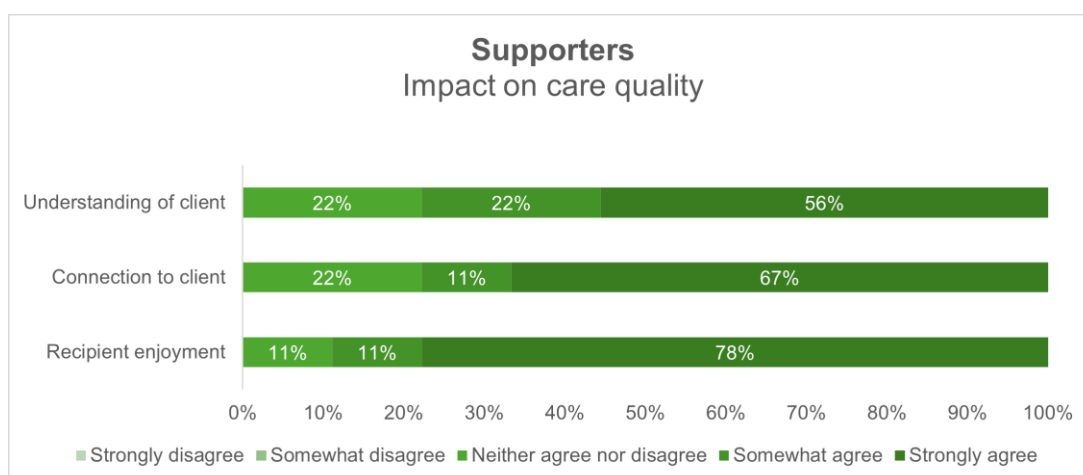


Figure 14. (above) Responses to statements regarding the impact of the Memory Box on the quality of care and supporter-client relationship, according to those who support recipients of the Memory Box.

What do supporters of Memory Box recipients enjoy most about the device?

Supporters are especially fond of the personal features of the Memory Box, and its potential to help users of the device to feel connected to their family and/or friends. This was highlighted by supporters as being especially valuable for residents who missed the company of loved ones in between visits. Supporters also reported feelings of compassion, where they enjoyed the opportunity to observe recipients of Memory Boxes interact with their devices. One supporter also said that the Memory Box was an effective tool for communication and supporting reminiscence and conversation:

“I feel it’s very meaningful and person centred. Reminding them they are loved”

“The lady really enjoys listening to her family”

“I was very special me see his face light up when listening to the box”

Suggestions for improvement according to supporters

The leading suggestion for improvement according to supporters was the addition of a volume adjustment function, followed by a noted difficulty removing the lid due to limited dexterity. One supporter also noted that the intricacy of the device’s design meant that it could be too delicate for use by some users.

Case studies

Individual case studies summarised below show the variety of contexts in which the Memory Box has been gifted, including its relative usefulness and case-by-case feedback. Case studies derive from interview findings.

Case study M35: A daughter's gift to her father who is living with dementia

Risk factors: Dementia

A Memory Box was gifted by a daughter to her father who, due to dementia, has difficulty retaining recent memories but vividly recalls past events. For the Memory Box design, the gifter hoped to reconnect her father with his identity prior to becoming unwell. The photograph showed her father delivering a speech at her wedding when he was “very animated and very happy” and was paired with an audio extract read by the gifter as she reflected on fond memories of past family events from her childhood. The gifter explained that for her father, the Memory Box was an excellent “prompt” to elicit memories of specific events that he would otherwise struggle to recall voluntarily. Such prompts were described as effective memory and conversational stimulants, and the gifter was pleasantly surprised by how moved by the gesture her father was. The process of designing the Memory Box was also described as a form of positive “reminiscence” by the gifter, and for her mother who was fondly reminded of the happy and adventurous times that the family enjoyed before the decline of the recipient's health. Both the gifter's father and mother can operate the Memory Box, but due to her father's condition the gifter believes that he is unlikely to independently remember to initiate use of the device. The gifter also suggested that replacing intricate design space with more photographs, and perhaps specific dates, could offer additional features that would “prompt” a user's recall of key people, events, and dates.

Case study F44: A husband's gift to his wife, whose children live abroad

Risk factors: Dementia, loneliness, isolation, anxiety, confusion

The gifter of the Memory Box is a husband who has designed the device for his wife who is living with dementia, and whose children and grandchildren live abroad across various time zones. The gifter described the process of designing the box as a collaborative effort that was conducted primarily by his wife's children and their decision to also include the grandchildren. The audio recording was composed of 5-6 different messages, where some recordings reflected on past events and others on more recent family trips. According to the gifter, the purpose of the Memory Box was to serve as an intermittent connector to family when contact time is impeded by time differences and busy lives. The Memory Box is regularly used at both the breakfast table and as an accompaniment while the couple are building puzzles. The act of gifting the Memory Box and facilitating its creation was “rewarding” for the gifter, who felt “satisfaction and pleasure” from watching his wife become immersed while using the Memory Box in a “trance” state as she “looked off into the distance”. The gifter is

an engineer who valued the simplicity and intuitive design of the device that meant it could be used rather than displayed as an ornament, but also suggested benefits afforded by additional features such as visible battery life and updatable media.

Case study A56: A son's gift to his parents whose grandchildren live abroad

Risk factors: Dementia, loneliness, isolation, anxiety, confusion

The gifter has designed a Memory Box as a joint gift to his mother, and his father who is living with dementia, and was identified as being at risk of loneliness and anxiety. The gifter's parents are rarely able to see their grandchildren all together, as much of the family live in different parts of the world. The gifter organised the design of the Memory Box, asking his children and grandchildren to create recordings of cherished memories of visiting their grandparents at their holiday caravan. The gifter's father has recently been diagnosed with dementia, and so recalling distant memories is difficult for him but is facilitated by the gifter's mother who has an excellent memory. The gifter enjoyed listening to a shared memory of the same event witnessed from different perspectives and explained that the Memory Box was an excellent stimulus for instigating more meaningful conversations and reminiscence beyond what would normally take place over a regular phone call. The recipient of the box (gifter's mother) said that she enjoyed listening to her grandchildren recall fond memories of events that she had since forgotten about, and that sharing the box with others e.g., carer and cleaner was an enjoyable experience. The most poignant feedback from the recipient was that it was nice to be able to hear her grandchildren's voices together when it was so rare to be able to see and speak with them all at the same time.

Case study B38: A wife's gift to her husband who she supports as he is living with Alzheimer's

Risk factors: Alzheimer's, anxiety, confusion, pain

The recipient of the Memory Box is an individual living with Alzheimer's, who has difficulty to access long term memories e.g., names of grandchildren, and also little short term memory. The recipient was gifted a Memory Box by his wife, who is also his carer. The gifter's experience of the Memory Box was ambivalent; using the Memory Box could be upsetting for both parties when audio prompts about family members whose names the recipient had forgotten highlighted significant gaps in memory, however, when introduced gently, prompts to such topics stimulated the recipient's long term memories, which in turn opened up discussion points, so much so that he "opened up and it was like a flood of memories" (although not always correct) The gifter explained that a different approach taken by the recording could have facilitated a more positive experience: *"I wish I'd done the recording differently, because by me prompting him on the beginning of the recording i.e. talk about our family, it highlighted actually how his memory had slipped and that did give him stress. So, when we use it now, which I do try to every day to try and actually get him to focus on turning it on and off, I play it in another room and then bring it through when he starts to talk about long term memory and then he loves it [...] I have learnt that [husband/recipient] opens up wonderfully when listening to his voice about his working*

life and childhood. I wasted valuable recording time prompting him to remember more recent memories.” This unexpected prompting of discussion and sharing of memories was very positively received by the gifter but did also highlight that the way in which the audio prompts are delivered, if not done so gently and according to cognitive capabilities of the recipient, could be upsetting for both parties.

Case study H18: A daughter’s gift to her mother who is living with dementia in a residential care home

Risk factors: Dementia

Two daughters created and gifted a Memory Box for their mother, who was living with dementia at a residential care home. The gifters included recordings of their voices detailing every-day events, updates within the family, and a reminder that they would be visiting the recipient soon. Although the gifters are able to visit the recipient regularly, the recipient often forgets when visits have occurred, and so the Memory Box was intended to be a reassuring tool in between visits. The audio recording ended with a favourite song of the recipient that reminded her of her late husband and was known by the family as a comforting stimulus. Although the gifter is very happy with the reception of the Memory Box and says that their mother thoroughly enjoys listening to it, keeping it on display alongside other photographs to show visitors, there is uncertainty regarding long term use due to the independent skill and memory required to use the device. The gifter explained that the recipient of the device is often forgetful and will lose items, and although they can switch on the device it does require prompting from somebody else. Alternative modes for activating the device were suggested as potentially useful, as well as support from carers to use the device

Case study D14: Siblings’ gift to their mother who is living with Alzheimer’s

Risk factors: Alzheimer’s, loneliness, isolation, anxiety, confusion

The Memory Box was gifted to the recipient who was living with dementia and Alzheimer’s and receiving care at home. The device was gifted by the recipient’s children and included a recent photograph of the recipient and her two children, and the audio recording contained voice messages from the recipient’s friends that focused on descriptions of enjoyable days out that they had shared together and ended with a poem. The recipient found it emotionally moving (in a positive way) to hear familiar voices reflect on happy times that had been shared together prior to her dementia. She acknowledged that it made her happy that people still thought about her and remembered her how she was. The gifter also explained that the recipient enjoyed listening to the Memory Box in the evening, and that it had become part of a routine for her. The sound was highlighted as a potential limitation, as there was no option to increase the volume.

Case study Z75: Daughter's gift to her parents who both have Alzheimer's and live together in a care home

Risk factors: Alzheimer's, anxiety, confusion

A Memory Box was jointly gifted to a married couple, living together in a residential care home. The gifter was their daughter, who designed the box primarily for her mother who was living with Alzheimer's and would sometimes become anxious when her father is out. The audio recording is a daughter's description of family updates and the normalities of every day, references to where her parents used to live and work, grandchildren and holidays. The recording also includes reminders that the daughter will visit soon. The gifter explained that her mother enjoys listening to the box and takes a lot of comfort from it, and that carers will play it for her when she needs some reassurance or is feeling anxious while her husband is out. She did, however, highlight that her mother was not able to operate the device alone, and that this was done for her either by the carer or the gifter's father. The gifter explained that the Memory Box often evokes fond yet poignant emotional responses for both parents, being reminded of happy times and bringing happy tears, and moments of connection, with comments like, 'Do you remember that?'. For the gifter, creating and gifting the Memory Box to her parents brought her a sense of reassurance also, that she could provide a calming tool that her mother could use when she was not able to visit. And for her father, to be able to cheer him up with reflections of fond memories of the past that both remind him of happy times and act as a conversational trigger.

Findings from interviews

Interview findings were subjected to a thematic analysis, and 5 overarching themes were identified. Themes are presented below, along with their respective sub-themes, and in order of prominence. Note that many themes are largely a product of the sample of participants that were interviewed e.g., use of the Memory Box by individuals with dementia, and adaptations to improve the device for the purpose, constitute the most prominent theme. This is likely because many of the individuals interviewed were loved ones of those living with dementia and/or Alzheimer's.

Theme 1. Impact of the Memory Box for those living with dementia and Alzheimer's

A prompt for memory recall

Perhaps unsurprisingly, the Memory Box was described as an effective tool for helping people with memory loss to recall fond memories of past times. The delivery of memories via an audio recording, read by loved ones with whom recipients shared these memories, was perhaps paramount to the recall of the memories themselves. A gifter explained that while their mother was able to recall events from the past, their father who was living with dementia was less likely to, and that the Memory Box, due to the unique way in which it captures and delivers memories, served a beneficial purpose in being able to elicit these memories:

“Actually hearing his grandchildren talk about it [...] it was even more of a trigger for him than for mum. For her, I think that it was probably more that kind of emotional bit because she probably has those memories and [the box] just sort of made them more vivid for her. But I think they were memories that probably he wouldn't have been triggered with without [memory box]” (gifter)

The Memory Box was especially effective for the recall of long-term memories. Gifters of the device often described the experience of recalling distant but fond memories in a rather poignant way, where several reported that their loved one had shed happy tears when using the device. Moreover, the stimulation of memories opened up conversations that, due to the disease, had become quite uncommon; an outcome from using the Memory Box that was greatly valued by loved ones of those living with memory loss:

“It's just wonderful to see [loved one responding to the device] because I've talked about the family and the memories and the things he did when he was growing up, all the sports that he did, the grandchildren, and every time he listened to it he will stream, but in a good and positive way. He'll often say 'what's this?' and lift the lid and look at the photo, it's one of his favourite photos of mum and him when they got married, then he'll see the button and I'll see him cry but it's not in a sad way, it's in a positive way” (gifter)

“Where [Memory Box's] strengths are, which I wasn't expecting, is his career. And because we were going back many years, he just opened up and it was like a flood of memories. Not all [correct], but that doesn't matter; he started to

really talk, which is something that again, on a day-to-day basis, it doesn't happen, so that was an absolute positive effect of it" (gifter-supporter)

"For people with dementia, they have little, small moments of joy, and then obviously revert back to not remembering or quite recalling, but it's being able to give those small moments of joy, and if [box] is one of those things that can be reused on a daily basis or weekly or monthly" (gifter)

"Mum really loves doing is looking through old photos, but she suffers from macular degeneration, which means her right side is sometimes quite impaired. And I thought it would, you know, the fact that you had recordings from people that she doesn't see as much now, and because once you're diagnosed with dementia, your world becomes a lot smaller and [Memory Box] is a way of opening up the world a little bit for her again" (gifter)

Comfort

Two participants also referred to the comfort that the Memory Box could provide for those living with dementia, particularly at times where they might feel distressed or disoriented:

"I think in situations where [mother who has dementia] is sort of disorientated, sort of hearing familiar voices and then her lovely piece of music, [Memory Box] sort of, you know, brings her back from and perhaps distracts her from the worry and the anxiety at the time." (gifter)

"I have used it quite a bit. Just when I want some comfort" (recipient)

"Mum absolutely loves listening to all of those things, it lights her up, it makes her very happy when she's taken back to those times. It was a really reassuring gift for her to have when I'm not there" (gifter)

"She likes to listen to [Memory Box] and that is really good because if she's feeling distressed about something [...], sometimes she thinks she'll need to go back to a house she lived in 60 years ago to pick something up or else she's going to get told off. And [Memory Box] does help sort of settle her [...] it's a way of helping anchor her because we say, 'oh, well, you know, look who are in the photos on the walls' and things that are hers" (gifter)

"It's been very a difficult journey when you've got anyone you love with dementia. Both parents have it, it's horrible. We can't always be there, knowing how much my mum, how badly she gets anxious when my dad isn't there, it was so reassuring to be offered something [Memory Box] to help comfort her, I know she can't use it alone but when dad is there he'll help operate it and [carers] help too. It was such a lovely tool that she's got something that can reassure her, because that's what she needs a lot of the time, most of the time about who will be visiting and when, and so on recording I'm saying 'oh this day so and so is coming' and so for my mum it reassures her at that point that someone will be there son to see her." (gifter)

Identity

A key part of helping loved ones to recall and share fond memories is the reminder of their identity prior to dementia and/or Alzheimer's, reported by both gifters and recipients of the device. One gifter explained that her parents' lives had become very limited since her father's diagnosis of dementia. In this instance, the Memory Box served not only as a memory prompt for her father, but also as a source of comfort for her mother to be reminded of the eventful times and busy lives they had shared prior to dementia. This effect was described by two gifters and shows that the Memory Box can provide comfort to both to individuals living with memory loss, but also their loved ones whose lives have also been changed by the disease. A recipient of a Memory Box who was living with dementia also explained that to be reminded by loved ones of happy memories that they had shared together, and to be remembered in this way, rather than to be associated with dementia, brought them a great deal of comfort:

"It helped her remember as well, because I think they got into this everyday life of staying indoors, watch the telly, et cetera, and don't move out of their little bungalow. Just gave her a bit of a boost to think 'gosh, we did do a lot of things' and, you know, 'we had an exciting life', so it was a good little reminder for her." (gifter)

"[recording] was very personable, sort of things that we still laugh about and that I know he likes hearing about, you know, three or four groups of families would all go together and there would always be some disaster. But he was always centre of attention or doing something amusing. So, I think he needed to hear that. Remembering what he was like compared to how he is now [...] for his sort of confidence just to remember, you know, how much fun we had and how he was full of life." (gifter)

"I like looking at the photographs and listening to quotes and things they've put in there for me [...] It makes me feel happy that people still Remember Me [...] It's very moving. To know people remember me as I was" (recipient)

"He loves to constantly listen and be reminded of all the wonderful things he's done in his life, all the memories we've had" (gifter)

Content of audio recordings

Case study B38 demonstrates that although the Memory Box can be beneficial for those living with Alzheimer's, there are certain conditions to maximise these benefits and limitations to be aware of during device design and utility. The Memory Box is a powerful tool when it is used to stimulate and share long-term memories (this is evident from Theme 2, below), such as those from an individual's childhood and career; memories that are more deeply embedded, and whose elicitation can be an excellent catalyst for meaningful conversation and emotional connection. However, Case study B38 shows that if the design of the audio recordings prompt recall of harder to access memories, it can cause confusion and stress for both the user of the device and their loved one, emphasising the need for careful consideration of the audio content and management of the device. In the case of B38, audio prompts of more recent memories highlighted areas of significant cognitive decline and unretrievable memories that were

upsetting for both individuals. Curating Memory Box prompts that celebrate what remains of a user's memory, rather than what has been lost, appears to be key to its success and overall benefit for its user:

"In the recording I started off talking about the family, [...] what are their names and who were they [...] but he couldn't remember the names. I'd rather have opened up a question about long term memory and let him talk because that's where he's getting the comfort from [...] I actually highlighted the laps in his memory and it was very difficult to not to [show] the shock that he couldn't remember two of the grandchildren's names [...] I wish I'd done the recording differently, because by me prompting him on the beginning of the recording i.e. talk about our family, it highlighted actually how his memory had slipped and that did give him stress. So, when we use it now, which I do try to every day to try and actually get him to focus on turning it on and off, I play it in another room and then bring it through when he starts to talk about long term memory and then he loves it" (gifter-supporter)

Theme 2. Social impact and emotional connection

The Memory Box is a catalyst for reigniting shared memories and meaningful conversation

This sub-theme very much a mirror of Theme 1, in that it demonstrates the potency of the Memory Box for those living with memory loss. Many participants agreed that the process of either creating the audio recording themselves, or orchestrating its design with others, meant that often long-forgotten memories were shared between loved ones in a way that meant memories were both reignited and shared from different perspectives. Loved ones enjoyed sharing and comparing their different perspectives, and the natural progression of a domino-like conversation of interconnected memories, where the device was described as a "trigger" that could "spur conversation". These conversations were praised for their ability to bring loved ones together over a shared memory of an event, in a way that was highlighted by one participant as occurring on a level deeper than those which normally take place with regular catch ups over the phone:

"When we're listening, watching it together, you know we'll say 'Oh, remember that?'" (recipient)

"It was wonderful because some of the things [children] came up with, the things that I'd even forgotten about, it was the look on their mum and dad's face when they heard them and it was lovely, just to see that recognition and you could see them thinking back. But actually, it then took on a second level really because once they'd played them through, we then played them again, and after each one we talked a bit about 'what do you remember of that?' and so it formed like the foundation for a conversation with mum and dad that they won't normally have" (gifter)

"For it to be that initial stimulus and memory, but then that follow up- being able to have a number conversation [...] this is going to be a stimulus to something far bigger. And we've had some lovely conversations" (gifter)

"it was bringing back memories I'd even forgotten from, you know, from it. It was. It was amazing. You just opened up and he was talking without any prompts whatsoever. Some the information was wrong on several points but it didn't matter. " (gifter-supporter)

"[recipient] really does engage in it. He listens to it with smiles and beams, and then he'll say 'do you remember that?'" (gifter)

"If I set up a telephone call with them with their grandchildren, my children, it tends to be "how's the weather? What's it like up there?" And it's OK as far as it goes, but it doesn't kind of get into a more emotional, meaningful level" (gifter)

The Memory Box was also described by one gifter and one recipient as having a particularly immersive effect during use. This appears to be primarily due to the audio feature of the device, particularly when it is read by the familiar voice of a loved one:

"It really brings all that back to you, you know, and you can in your mind vividly see it" (recipient)

"As soon as she uses it, I mean she sort of went off almost into a trance with it [...] She picks it up and I've got this photo of her holding it in her hand, but sort of looking off into the far distance as she almost relived the memory [...] it wasn't as though she was looking at the box, she was sort of looking way beyond the box and sort of almost reliving memories" (gifter)

Connection beyond the gifter and recipient

Some participants noted that their loved ones would enjoy sharing their Memory Boxes with others, including supporters, carers and friends, demonstrating that the Memory Box is something that recipients and users enjoy sharing with others, but also that the process of the sharing experience can help third parties to understand more about the owner of the device:

"[carer] said [Memory Box] was lovely. She said that talking to mum and dad about some of the things on the box, because she's never met my children, she said it was lovely, hearing their voices, she said 'these people I don't know, and then talking to your mum about them', and mum in particular was sort of then telling her more and more about each one of the grandchildren and their partners and everything" (gifter)

"The first thing she wants to do is show [visitors] her box and play it too. She loves it in [...] situations where she just wants to sort of like beam and show it, and because she's really pleased with it" (gifters)

"[recipients] will tell me all about how they've shared [Memory Box] with the carer or the lady next door who pops in, and so they're clearly now taking great interest in and shared it with them as well." (gifter-supporter)

Theme 3. A meaningful experience for gifters

Gifters of the Memory Box described the process of designing and creating the device, or orchestrating the design with loved ones, as a positive and purposeful experience. For gifters, the ability to create the device brought comfort to many, to know that they could create and gift something to a loved one that would hopefully bring them comfort when they could not be physically present with them. This was often described as a meaningful gesture, the process of which was very reminiscent for gifters themselves. This was followed by the enjoyment of witnessing a loved one use a device that had been created and gifted with care and purpose, and the observation of their emotional response. Together these findings suggest that the process of creating and gifting a Memory Box is a way in which a gifter can feel emotionally connected to their loved one:

"I just took myself away, and it didn't make me sad, it made me really grateful of what super opportunities [parents] had given me and my sister and what great moments we'd had. So it was a really nice to sort of reminisce." (gifter)

"You know, I started crying when I listened to all my friends messages [for recording], it was really lovely that they'd taken the time to do it" (gifter)

"We couldn't quite believe [recipient's] reaction [...] [parents] were really touched, which is quite unlike them [...], he's not very keen normally to speak on the phone and he was really touched and very just kept saying thank you[...] So it obviously really struck a chord with him, you know, to remember those sort of emotions, even if it was just for that, you know, 20 minutes" (gifter)

"For me, seeing my wife's satisfaction and pleasure from that was great [...], it was great, really was very rewarding from my point of view [...]" (gifter)

"The reactions when you watch them listen to it, it's wonderful" (gifter)

Gifters also commented that, in cases where audio recordings were composed by multiple family members, it was an enjoyable experience to not only be reminded of events long-forgotten, but to hear about events seen and witnessed from different perspectives. In this sense, the creation of the Memory Box, when undertaken as a collaboration between family members e.g., father and daughter, can facilitate emotional connection between more than one gifter:

"Of course, I remember [events]but it's never been referred back to us before, but it was obviously very special to them and very special to mum and Dad. So, it's this lovely sort of bond between them and having two of them come at it from slightly different angles, maybe it's made it much fuller" (gifter)

Theme 4. Device accessibility

Although the Memory Box was frequently praised for its potential for use within the context of dementia and/or Alzheimer's, a notable limitation suggested by several participants was the extent to which users would be able to operate the device

independently, primarily because of the cognitive impairments associated with the disease itself:

"if you're looking at somebody who lives by themselves, [or who] is in a care home where the carers haven't got the time to be doing that [support to use the device]." (gifter-supporter) "His first go [using the box] [...], he thought by taking the lid off, that was going to start it off, and I don't whether you've heard that from other people. And I don't know how from a future going forward, whether on the start that could be linked into a moving it, to getting it going [...] the difficult thing there is it is designed to be a functional box [...] but then somebody in early stage dementia would have no problem with that. " (gifter-supporter)

"[recipient's] not really able to put it on herself. She needs prompting on there's an on off button. And then you have to press it [...] even though it's there on the side and she'll pick it up, I don't think she can listen to it independently. But quite often she'll say I'll bring it over and then I have to listen to my son speak again." (gifter)

"I don't usually refer to it on my own, but if I want to have it on my I can always get someone to switch it on for me because I I worry I'll put it wrong or something, you know" (recipient)

"the carers will go in and play the box for her so that she's got something to listen to, and unfortunately for my mum she can't use it for herself, she cannot work out how to turn it on, shell lift it and look at the picture but not think to lift and look at button underneath [...] if the carer isn't around, it's just a picture for her to look at" (gifter)

These findings emphasise the importance of support to use the Memory Box in situations where the user and/or recipient has limited capacity.

Theme 5. Overall design and suggestions for adaptations/improvements

All participants who were interviewed said that the experience of the Memory Box was overall a positive one.

The high quality and clarity of audio recordings was highlighted by several participants, and many agreed that the device was well-designed and beautifully constructed:

"I just love the way it's been made and put together, it's such a clever and tactile thing as well. It's not as though you put it down and you're afraid to touch it, it's something you do want to pick up. It fits nicely into the hand. It's not soft, but it certainly sort of comfortable in the hand" (gifter-supporter)

"The thing about [a digital photo frame] is that it just sits there and it flicks through and you've got sort of pictures scrolling by, so it's not as though you need to pay attention to it, it's almost as though it's a comfort thing. The memory box is different because in a sense it captures your attention because you're

listening to it, and you interact with it differently because you have to sort of trigger the memory by pushing the button” (gifter)

Suggestions for design adaptations for accessibility, and overall improvements include the following:

- Automatic audio trigger. For example, through the removal of the lid, touch sensitivity, or through picking up the device
- Additional engravings to facilitate specific memories and/or information e.g., information e.g., *“like mine and my sister’s date of birth and our full names. You know their grandchildren’s date, but just, you know, so it gave him a little bit of a, a jolt every time”* (gifter)
- Addition of more photographs.
- Consider the dexterity for certain populations
- Indication of charging connection e.g., one participant added a painted spot on the side of the charging lead and port, to improve visibility for parents
- Updatable content e.g., photographs could be interchangeable and audio recordings updated to promote continuous use

Memory Boxes in a residential care home: Focus group with care staff

Ten Memory Boxes were distributed to a single residential care home, created and gifted either by family members of residents or the facility's care staff. A focus group was conducted to capture the impact of the Memory Box within a residential facility that provides specialist support for those living with early-stage and advanced dementia. The focus group included 3 staff members: an activities manager, a carer, and a care manager. Recipients of Memory Boxes were residents with early-stage dementia, or those with advanced dementia who required significantly more physical support.

Findings from the focus group were subjected to the same thematic analysis used to interpret interview findings. Three interconnected themes were identified, detailed below.

Theme 1. Limited benefits for users with advanced memory loss

By far the most significant theme was the conditional benefit of the Memory Box for people living with advanced dementia and/or Alzheimer's. Specifically, the Memory Box appears to be beneficial for those with perhaps early stages of memory loss associated with dementia and/or Alzheimer's -as interview findings and case studies strongly show- but could have negative effects on the wellbeing of users with advanced cognitive decline. For the recipients of the present study living at a residential care home, Memory Boxes were only beneficial for residents with early-stage dementia, and frequently elicited upsetting and distressing responses from residents for whom the disease was more advanced:

"I think it's a case of picking the residents [with appropriate level of cognitive capability], but a lot of the time we don't really know what kind of emotional response it's going to be- helpful or harmful- until we give them the memory box."

"Sometimes [resident with advanced dementia] is quite fascinated, and she loves to hear her daughter's voice, and other times, because of her dementia, she has really tearful days and hearing her daughter's voice, it sets off something and she gets very, very upset. She does see her daughter regularly, so I'm not sure what is triggering that emotional response."

"It's wonderful [initially], because when [residents with advanced dementia] first get [Memory Box], you see their faces light up while they're listening to it, but something happens and I don't know what it is, but they lost that"

"[resident with advanced dementia] carries it around with her, the lid is missing, I mean, she likes the box, because she carries it around with her all the time, but she won't listen to it. If you try to put it on for her she says 'no, no, no, I don't want to' [...] Originally she was listening to it, I don't know whether maybe it

upset her and she remembers that, or she's heard it before and she remembers it and doesn't want to hear it again. Yeah, quite advanced dementia"

For other residents, with lesser symptoms of dementia, the Memory Box was a beneficial tool to comfort and reassure individuals in between family visits, although still was not guaranteed to produce a positive effect on the user:

"Some days are different to other days. I've seen [resident] and she loves her box and she'll use [Memory Box] and it relaxes her. I suppose in that instance [resident's] daughters visit her quite regularly, but she does forget that they've visited, so sometimes she'll say 'oh, I haven't seen my daughters in a while' and [on the recording] her daughters will say something about 'I've been at work today, I'll see you tomorrow', so it kind of reminds her that she has seen them [...] every day is so different as well, some days they'll be feeling really happy and a resident will love to listen to her daughter, and other days she's very teary perhaps, so on those days it's not good for her to use it."

For those with advanced dementia, carers also reported little-to-no engagement. One carer explained that although the resident was aware of the sound, they did not appear to be attending to it. Photographs were also not noticed by residents, and carers agreed that it would not be possible for residents to switch on the device by themselves:

"I've seen [resident with advanced dementia] use his a few times. He also has dementia, he usually potters about in his room while he waits for someone and every now and then he picks it up and presses the button. I'm seeing no strong emotional response from him. I've not seen his wife interact with her box at all. But then again, these are all people that interact very regularly with their family."

"The trouble is, I've found with [advanced] dementia residents that they're not interested in [Memory Box] them at all, sort of, the carers will go in and maybe press the button. There's one lady who's just put it in her bag, but she doesn't know what it is. But with the other [non or early-stage dementia] residents who know what it is, the box is pride of place on their mantelpiece like a little ornament. They will press the button and we see the smiles, it's lovely."

"I've seen a few of them that have been broken, or their lids are missing. Then on the other [non-dementia floor], they're pride of place. It's kind of more like an ornament with their precious things."

Theme 2. Independent use is limited

Like findings from interviews, above, independent operation of the Memory Box is limited if the user has an advanced degree of cognitive impairment. In many cases, the device will be turned on by a carer or loved one, rather than the user instigating this themselves without prompt. This limits the use of the Memory Box, and in such cases means that it is more akin to a standard, non-interactive photograph frame:

“[resident will] sit for quite a long period of time using it, but again, she couldn’t use it on her own. She can’t push the button.”

“One of the residents, she can’t operate [Memory Box] herself, so sometimes the carer has operated the box for her [...]”

One staff member suggested the addition of an automatic feature that would trigger the audio onset, however also acknowledged that audio trigger by lifting the lid, or picking up the device, would not be suitable for those with dementia. Memory Box lids were already highlighted as an issue as they commonly became lost, or the intricacy of their design was difficult for users to engage with if they had limited dexterity.

Theme 3. Adaptations for us within clinical environments

In many cases of users with advanced dementia, Memory Boxes were also becoming damaged and /or their lids lost. Carers suggested that in order to further adapt the Memory Box for use by populations with advanced dementia, certain design features would need to be adapted and tested. Useability issues included:

- Delicate lid design, such that some lids were difficult for users to remove themselves e.g., the brass knob was described as “too small”. Some lids were also “stiff”.
- Removable lids meant that for users with advanced dementia, lids would be removed and then lost or damaged
- Structural delicacy of the device meant that when used by individuals with advanced dementia, boxes were more likely to be damaged and/or broken
- Photographs may be too small for some users to be able to see
- Colour scheme of the box is perhaps not best suited to those with dementia, as it is “muted”
- Material cannot be cleaned to standards of clinical settings

For example:

“The box has caused a few problems [on floor for advanced dementia], and some residents are throwing them. I think if they were given to more advanced dementia users, they need to be more robust, something plastic or bright coloured”

“Structure of [Memory Box] itself, it’s quite muted [colour], it’s brown rather than bright colours. So maybe a bit brighter.

“A volume button would be really helpful, because some people can’t hear very well, and actually they’re like ‘what am I listening to?’ and they’ll hear some bits but not the rest [...]”

“You’d want to have a choice, if you were buying one, whether it was bigger or smaller, and obviously you can’t wash them. So, you know, a lot of people with dementia, if they’re sitting with it and eating their dinner for instance, you’re

going to end up with a very messy box that's not able to be cleaned very well at all."

Theme 4. Bespoke boxes

One staff member suggested that the difficulty of striking a balance between design features, the progression of user's dementia, and personal preferences, could be addressed by offering bespoke design features that could be chosen at the point of device creation and design:

"It's difficult isn't it, because say, [resident] loves her ornaments and she loves [memory box], if it was big and bright and robust, she wouldn't like it the same [...], so I think maybe [design] should be a choice, like a range of sizes and colours and what not, just so that we can tailor to what the individual would like"

Summary of findings

Views of the Memory Box according to recipients

Of the 12 surveyed recipients who were gifted a Memory Box by a loved one, most enjoyed the experience of using the device and found it to be accessible in terms of useability and interaction. Certain adaptations to the device, however, could meaningfully improve its useability, particularly within the context of volume adjustment and control visibility. Such changes could make the device more accessible and thus maximise its impact, evidencing the need for further evaluation of any adaptations. Most recipients were using the box relatively frequently during the time of the study, and this was generally expected to last into the future. Many felt a sense of connection to their loved ones through the Memory Box and agreed that it brought them a sense of calm and relaxation. Most also agreed that the device could be gifted as a meaningful gesture and could support the wellbeing of others. Qualitative feedback from Memory Box recipients showed that the device could have a strong emotional impact, where many reported improved feelings of comfort and mood; particularly valuable to recipients is ability to hear the voices of loved ones and to feel more connected to family. Recordings were excellent for triggering cherished memories and were very meaningful to recipients, and many reported enjoyment of reliving shared memories.

Views of the Memory Box according to gifters

Of the 28 surveyed gifters of Memory Boxes, nearly all reported that their loved one enjoyed receiving the Memory Box, and many experienced a sense of connection and emotional comfort through the process of creating and gifting a device for their loved one. It was widely viewed as a meaningful gift that can support wellbeing and strengthen relationships, and most found the device to be intuitive and straight forward to use. However, several design features were highlighted as areas where improvements could be made, particularly with regards to the devices' accessibility and therefore useability for certain user populations. In particular, the visibility of buttons were highlighted as an issue, suggested solutions for which included larger, more visible buttons and photographs, instructions for use for less technologically confident users, and the addition of volume control. Featural adaptations in terms of the design appeal included the ability to update and add multiple media.

Views of the Memory Box according to supporters

Feedback from 9 supporters of individuals who had been gifted a Memory Box was generally positive. The Memory Box was considered as easy to use and visually appealing, and very positively rated by all supporters for its ability to improve wellbeing, bring people together, and serve as a meaningful gift. However, feedback from supporters focused on the accessibility of the device; the tight-fitting lid was an issue for those with limited dexterity, and the absence of volume control was considered to be a potential issue for users with hearing loss. Supporters were more likely to feel that the audio component of the Memory Box was its most important feature, followed by the combination of audio and photograph. Eighty-nine percent of

supporters said that the person supported appeared to enjoy the Memory Box, 77% said that it helped to foster a deeper connection to their client, and 78% said that it facilitated an understanding of their client. This feedback is very positive and suggests that supporters are strong proponents of the Memory Box for use in care settings. However, it is important to note here that there are certain limitations to the use of the Memory Box that were highlighted through interviews rather than surveys, see section below.

How useable, functional and attractive is the Memory Box?

The Memory Box was overall rated very highly for its appearance and quality of design. Many participants also noted that they were impressed by the quality of audio recordings. In terms of functionality and useability, this depends very much on the user. If users possess the technological skills to navigate the device, the Memory Box is considered very intuitive to use. However, if users are, for example, those living with dementia and/or Alzheimer's, the Memory Box is limited primarily by (1) its lack of visual reminders and prompts to both interact with and switch on the device, and (2) the intricacy of its design features which are not always accessible to those with limited dexterity. This finding is consistent with that of the DST literature, where research shows that rbDST's potential for positive impact is determined by its accessibility in relation to a given population, or individual user. Indeed, for older populations, the Memory Box appears to be very functional and useable, however as our case studies and focus groups with care staff suggest, the strength of its functionality and useability decline with the progression of users' cognitive capabilities (Critten & Kucirkova, 2017). Therefore, despite our finding that the Memory Box is frequently praised for its attractive, simplistic and intricate design, the extent to which it can be used for certain user populations is limited. For more information see below.

The impact of the Memory Box on individual wellbeing and social connections

Findings from both surveys and interviews unequivocally show the positive impact of the Memory Box on the social and emotional wellbeing not only of the end users of the device, but also the loved ones with whom it is shared, or indeed those that come together to create and gift it. Note the caveat of this impact, which is the level of cognitive decline that an end user may have. As with other methods and techniques used in DST, perhaps the most significant function of the Memory Box was its role as a stimulant for emotionally engaging and meaningful conversations between loved ones (Hausknecht, Vanch-Orosco & Kaufman, 2018; Damianakis et al., 2009; Critten & Kucirkova, 2017; Stenhouse et al., 2013). For recipients, the Memory Box was a comforting reminder of cherished memories shared with loved ones, personal identities prior to illness, and important events across one's life such as careers and holidays. For some, it was also a simple method to hear, through their loved ones' voices, that they would see each other again soon, and to hear about the simple events of daily life. For loved ones, many of whom were creators of the Memory Box, the device provided a sense of wellbeing. The process of creating something meaningful and personal for their loved one was reported by many as a very positive experience. Some gifters created Memory Boxes alone, and others orchestrated, for example, the organisation of messages from multiple grandchildren across the world. In many

cases, gifters explained that the process of creating and gifting a Memory Box gave them a sense of joyful reminiscence, but also appreciation of the person whom they were creating the device for. In cases where the recipient was someone living with dementia and/or Alzheimer's, some loved ones reported that they felt moved upon reflection of the recipients identity and the life they shared together prior to the illness. In this sense, the experience was described sometimes as "bittersweet", but ultimately demonstrates that the creation, gifting, and sharing of a Memory Box is impactful on both social and emotional levels for all who are involved.

What is the impact of the Memory Box for users with dementia and Alzheimer's?

Our findings show strong evidence of a positive impact for users of the Memory Box, including those at risk of isolation from loved ones and/or living with mild cognitive impairment such as early-stage dementia and/or Alzheimer's. Findings from surveys and interviews mirrored that of the published literature; that rbDST is an excellent method to capture personal narratives in a way that both preserves them as part of a family's legacy and makes them sharable with loved ones and supporters alike. It brings people together over shared memories and stimulates meaningful conversation that many participants of the study describe as emotionally and socially beneficial. Memory Boxes were able to remind both the recipient of the device and their loved ones who created them of the identity of the user prior to becoming unwell. This is just one example of how the process of making a Memory Box is meaningful for the gifter; the preservation of a family legacy is referred to by Damianakis et al., (2009) , but our findings go beyond this in showing that gifters who create digital stories for their loved ones also feel a sense of reassurance and care, and are able to reminisce and appreciate cherished times, particularly when the creation of the digital story is a collaborative effort. The overarching theme that Memory Boxes are a device that stimulates meaningful conversation and social connection between loved ones demonstrates its efficacy as a technique and mode of rbDST. Moreover, a critical feature of the Memory Box is the integration of photograph and voice recording, where voice recordings are delivered by the familiar voice of a loved one. We anticipate that such a positive impact on the wellbeing of those with mild cognitive impairment could be, at least in part, due to the familiar voice stimulus. Research regarding the impact of familiar voices on positive mood and wellbeing for people living with dementia and/or Alzheimer's is rather limited. Stimulated Presence Therapy (SPT) is a technique whereby individuals are played recordings of a familiar voice e.g., by a loved one, where the content of recordings focus on positive and reassuring messages. This might include reminiscence and/or messages of comfort and reassurance. The aim of SPT is to reduce anxiety for people living with dementia and/or Alzheimer's by using a familiar voice as a stimulus for soothing and calming the listener. Woods and Ashley (1995) showed that when recordings were listened to, described as akin to a reassuring phone call, some individuals with dementia appeared to be less anxious and agitated. The authors also argue that SPT is an effective strategy for reducing social isolation in populations who do not have cognitive impairments. A 2017 review of the impact of SPT for dementia suggested that familiar voices, and familiar music, have the potential to significantly improve the wellbeing of those living with dementia because they recreate a well-known and familiar environment (Abraham et al., 2017). Moreover, the Lewy Body Dementia Association underscores the importance of familiar stimuli in promoting calm and wellbeing for people living with dementia, such

as keeping on display objects of familiarity e.g., photographs, memory books and photo albums. Similarly, the Alzheimer's Society suggest the use of a familiar song from earlier life could also be used as a strategy to calm and relax someone living with Alzheimer's. These findings, though limited, suggest that the Memory Box may be especially effective for those with mild cognitive impairment, or memory loss, because it services as a familiar and comforting stimulus.

It is, however, important to also consider that findings from a focus group with care staff suggests that a very individualised approach is necessary if the Memory Boxes are to be further used in residential care settings. Whether the device is likely to elicit a positive or negative emotional response from the user appears to depend very much on the stage and/or progression of the disease, and the consistency of their temperaments. Findings from a focus group with care staff, who were supporting Memory Box recipients with typically advanced dementia, were negatively skewed. In such cases, the Memory Box is significantly less appropriate for those with advanced cognitive impairment. Although residents with mild memory loss found comfort and emotional reassurance using the device, responses were inconsistent and often depended on the individual's mood at a given time or on any day. On the other hand, for those with advanced dementia little interest in the device was shown, and staff believed that independent use would not have been possible. Most importantly, the Memory Box could be upsetting for some residents. Indeed, similar feedback was also obtained from interviews with gifters; one notable case study showed that for an individual with Alzheimer's who had difficulty recalling more recent memories, audio recordings that highlighted attention to gaps in the users memory could be upsetting, which demonstrates the importance not only of the application within which the Memory Box is used, but the approach taken within the recording itself. These findings are consistent with those published in the literature, which together demonstrate quite clearly that although rbDST can be incredibly valuable and beneficial for those with mild cognitive impairment e.g., dementia and/or Alzheimer's, it is unlikely to be suitable for those living with more advanced forms of the disease. In such cases, it is crucial to consider whether the intended use of the digital story is to maintain calmness in the user or stimulate conversational engagement (Critten & Kucirkova (2017), where its design and expectations around its effectiveness should be guided by this.

Regarding the extent to which the Memory Box could be beneficial for those living with advanced dementia and/or Alzheimer's following continued use beyond what could be an initially upsetting experience, further exploration of device use within this specific population is required. Also noteworthy is that, in the instance of an individual with advanced dementia who did not show any emotional response to the device, it is not clear in these circumstances whether the Memory Box can produce a positive, unobservable impact on mood. For example, communication becomes significantly reduced for those living with dementia and/or Alzheimer's, and so the findings from the present project cannot infer about any impact on the internal state, such as feelings of calm and/or relaxation, that the device may provide.

Suggested adaptations to the Memory Box

Suggestions constitute 9 items across 3 categories:

Improvements to design and useability of the Memory Box

1. **Enhance structural durability.** This would make the device more useable for those with limited dexterity and/or cognitive decline. This could include the material of the device, and limitation of its intricate design.
2. **Hygiene capability.** Robust but washable materials will make the device appropriate for use in more clinical settings where regular cleaning is often required.
3. **Dexterity and visibility of features.** Larger buttons and tactile, or visual, indications of operation would benefit users with limited sight. Many participants who suggested such alterations did acknowledge that this would come at a cost to the simplicity of the device design. A redesign of the lid mechanism so that it becomes non-removable would make it more secure and reduce the possibility of it becoming lost. The knob of the lid, as it currently is, is very small and delicate and for those with limited dexterity is difficult to grip and manoeuvre. Moreover, visible features that indicate how to use the device will also benefit those with memory loss, as in many cases they may act as a trigger to interact with the device. Power switches could be made larger and/or positioned on top of the box, for example.
4. **Increase photograph size and number.** Would be useful for those with limited eyesight and to encourage more frequent interaction.

Functionality enhancements

5. **Automated audio trigger.** This could include audio trigger by the lifting, removal or interaction with the lid. Or touch-sensitive areas of the device. Though note that this should be considered in conjunction with suggestion 3, above.
6. **Adjustable volume control.** Many participants were pleased with the quality of the audio recording and its volume level, although some did highlight that for those with hearing loss, the lack of volume control made using the box difficult.
7. **Enable content updates.** Allow users and loved ones to refresh media, so that the value and use of the box has longevity.

Customisable features

8. **Dementia-friendly features.** Some care staff suggested that dementia friendly features could include a change to more robust material, a larger device overall, or a device with more colour vibrancy.
9. **Engraved personalisation.** Such as dates and names, for example, could help users to be prompted and reminded of significant dates and people.

References

- Abraha, I., Rimland, J. M., Lozano-Montoya, I., Dell'Aquila, G., Vélez-Díaz-Pallarés, M., Trotta, F. M., ... & Cherubini, A. (2017). Simulated presence therapy for dementia. *Cochrane Database of Systematic Reviews*, (4).
- Bertera, E. M. (2014). Storytelling slide shows to improve diabetes and high blood pressure knowledge and self-efficacy: Three-year results among community dwelling older African Americans. *Educational Gerontology*, 40(11), 785-800.
- Bhar, S., Stargatt, J., Collins, R., Bhowmik, J., & Silver, M. (2022). Preliminary evidence for the impact of digital life stories about aged care residents on staff knowledge and understanding regarding those residents; A single arm trial. *Journal of Clinical Nursing*, 31(15-16), 2252-2258.
- Carlson, L. M., Ridgeway, J. L., Asiedu, G. B., Wieland, M. L., Sia, I. G., Porraz Capetillo, G., ... & Njeru, J. W. (2021). Facilitated stories for change: Digital storytelling as a tool for engagement in facilitated discussion for reduction of diabetes-related health disparities among rural Latino patients with diabetes. *Journal of Transcultural Nursing*, 32(6), 707-715.
- Carter, C., Lapum, J. L., Lavallée, L. F., & Martin, L. S. (2014). Explicating positionality: A journey of dialogical and reflexive storytelling. *International Journal of Qualitative Methods*, 13(1), 362-376.
- Chang, H., Do, Y., & Ahn, J. (2023). Digital storytelling as an intervention for older adults: a scoping review. *International Journal of Environmental Research and Public Health*, 20(2), 1344.
- Chen, A. C. C., Kim, S. W., Ou, L., Todd, M., & Larkey, L. (2023). Digital storytelling intervention to promote human papillomavirus vaccination among at-risk Asian immigrant populations: pilot intervention study. *JMIR Formative Research*, 7, e46951.
- Craftman, Å. G., Swall, A., Båkman, K., Grundberg, Å., & Hagelin, C. L. (2020). Caring for older people with dementia reliving past trauma. *Nursing ethics*, 27(2), 621-633.
- Critten, V., & Kucirkova, N. (2019). 'It brings it all back, all those good times; it makes me go close to tears'. Creating digital personalised stories with people who have dementia. *Dementia*, 18(3), 864-881.
- Cueva, M., Kuhnley, R., Revels, L., Schoenberg, N. E., & Dignan, M. (2015). Digital storytelling: a tool for health promotion and cancer awareness in rural Alaskan communities. *International journal of circumpolar health*, 74(1), 28781.

Damianakis, T., Crete-Nishihata, M., Smith, K. L., Baecker, R. M., & Marziali, E. (2010). The psychosocial impacts of multimedia biographies on persons with cognitive impairments. *The Gerontologist*, 50(1), 23-35.

Davis, L., Iraheta, Y. A., Ho, E. W., Murillo, A. L., Feinsinger, A., & Waterman, A. D. (2022). Living kidney donation stories and advice shared through a digital storytelling library: a qualitative thematic analysis. *Kidney Medicine*, 4(7), 100486.

De Vecchi, N., Kenny, A., Dickson-Swift, V., & Kidd, S. (2016). How digital storytelling is used in mental health: A scoping review. *International Journal of Mental Health Nursing*, 25(3), 183-193.

DeLenardo, S., Savory, J., Feiner, F., Cretu, M., & Carnegie, J. (2019). Creation and online use of patient-centered videos, digital storytelling, and interactive self-testing questions for teaching pathophysiology. *Nurse Educator*, 44(6), E1-E5.

Ferrari, M., Rice, C., & McKenzie, K. (2015). ACE Pathways Project: Therapeutic catharsis in digital storytelling. *Psychiatric Services*, 66(5), 556-556.

Fiddian-Green, A., Gubrium, A., & Hill, A. (2023). Digital Storytelling: Public Health Storytelling as a Method and Tool For Empathy, Equity, and Social Change. In *Handbook of Social Sciences and Global Public Health* (pp. 1-22). Cham: Springer International Publishing.

Glassman, E., & Lewis, L. F. (2024). Digital Storytelling: Sharing Palliative Care Experiences as an Innovative Educational Approach. *Nursing Education Perspectives*, 45(1), 57-59.

Gomez, V., Kandahari, N., Curiel, D., Carter, A., Somkin, C. P., & Allen, A. M. (2023). Digital storytelling as a tool to increase colorectal cancer screening intention in a Latinx church community. *Journal of Cancer Education*, 38(6), 1825-1833.

Gruson-Wood, J. F., Reid, K., Rice, C., Haines, J., Chapman, G. E., & Gibson, M. F. (2024). The game of queer family life: exploring 2SLGBTQI+ parents' experiences of cisheteronormativity, racism, and colonialism through digital storytelling in Ontario, Canada. *Journal of Homosexuality*, 71(4), 887-915.

Hausknecht, S., Vanchu-Orosco, M., & Kaufman, D. (2019). Digitising the wisdom of our elders: Connectedness through digital storytelling. *Ageing & Society*, 39(12), 2714-2734.

Hewson, J., Danbrook, C., & Sieppert, J. (2015). Engaging Post-Secondary Students and Older Adults in an Intergenerational Digital Storytelling Course. *Contemporary Issues in Education Research*, 8(3), 135-142.

Ho, E. W., Murillo, A. L., Davis, L. A., Iraheta, Y. A., Advani, S. M., Feinsinger, A., & Waterman, A. D. (2022). Findings of living donation experiences shared on a digital storytelling platform: a thematic analysis. *PEC innovation*, 1, 100023.

Hollinda, K., Daum, C., Rios Rincón, A. M., & Liu, L. (2023). Digital storytelling with persons living with dementia: elements of facilitation, communication, building relationships, and using technology. *Journal of Applied Gerontology*, 42(5), 852-861.

Howard, A. F., Noga, H., Parmar, G., Kennedy, L., Aragonés, S., Bassra, R., ... & Yong, P. J. (2023). Web-based digital storytelling for endometriosis and pain: qualitative pilot study. *JMIR Formative Research*, 7, e37549.

Khoshkesht, S., Nasrabadi, A. N., & Dehkordi, L. M. (2020). Digital storytelling: The new arts-based research method. *Iranian Journal of Public Health*, 49(7), 1395.

Laing, C. M., Moules, N. J., Andrew Estefan, R. P. N., & DipNSc, B. N. (2019, March). Digital storytelling as a psychosocial tool for adult cancer survivors. In *Oncology Nursing Forum* (Vol. 46, No. 2, pp. 147-154). Oncology Nursing Society.

Lambert, C., Egan, R., Turner, S., Milton, M., Khalu, M., Lobo, R., & Douglas, J. (2023). The Digital Bytes Project: Digital Storytelling as a Tool for Challenging Stigma and Making Connections in a Forensic Mental Health Setting. *International Journal of Environmental Research and Public Health*, 20(13), 6268.

Lambert, J. (2013). *Digital storytelling: Capturing lives, creating community*. Routledge.

Laranjeira, C., Carvalho, P., & Querido, A. (2021). Digital storytelling: Art-based pedagogy to improve professional development for nurses. *The Journal of Continuing Education in Nursing*, 52(10), 454-456.

Loe, M. (2013). The digital life history project: Intergenerational collaborative research. *Gerontology & Geriatrics Education*, 34(1), 26-42.

Maragh-Bass, A., Comello, M. L., Tolley, E. E., Stevens Jr, D., Wilson, J., Toval, C., ... & Hightow-Weidman, L. (2022). Digital storytelling methods to empower young Black adults in COVID-19 vaccination decision-making: Feasibility study and demonstration. *JMIR Formative Research*, 6(9), e38070.

Mazzoli Smith, L., Hardy, P., Thompson, K., & Westwood, L. (2024). Transformative and therapeutic benefits of digital storytelling: a phenomenological lifeworlds study of Patient Voices participant experiences. *Arts & Health*, 1-18.

Mojtahedzadeh, R., Mohammadi, A., Emami, A. H., & Zarei, A. (2021). How digital storytelling applied in health profession education: a systematized review. *Journal of Advances in Medical Education & Professionalism*, 9(2), 63.

Moreau, K. A., Eady, K., Sikora, L., & Horsley, T. (2018). Digital storytelling in health professions education: a systematic review. *BMC medical education*, 18, 1-9.

Munk, S., Toohey, R., Remtilla, A., D'Cunha, N. M., Gibson, D., Isbel, S., ... & Bail, K. (2025). "I forgot she used to make chocolate cake": Digital storytelling supporting

person-focussed dementia care: A qualitative thematic analysis. *Dementia*, 14713012251317761.

Paterno, M. T., Low, M., Gubrium, A., & Sanger, K. (2019). Mothers and mentors: Exploring perinatal addiction and recovery through digital storytelling. *Qualitative Health Research*, 29(4), 545-556.

Petty, J. (2024). Using arts-based digital storytelling in neonatal care to enhance nursing students' empathy. *Nursing Children and Young People*, 36(3).

Pinquart, M., & Forstmeier, S. (2012). Effects of reminiscence interventions on psychosocial outcomes: A meta-analysis. *Aging & mental health*, 16(5), 541-558.

Pu, D., Bonnici, R., Shorr, R., & Haines, T. (2022). Digital storytelling to facilitate consumer engagement in healthcare research. *Health Promotion Journal of Australia*, 33(3), 758-767.

Reyhan, F. A., & Dağlı, E. (2024). Investigation of midwifery students' opinions on the digital storytelling method in midwifery education and assessment of their digital stories. *Nurse Education Today*, 140, 106262.

Rolbiecki, A. J., Washington, K. T., & Bitsicas, K. (2021). Digital storytelling as an intervention for bereaved family members. *OMEGA-Journal of Death and Dying*, 82(4), 570-586.

Sikapa, L. L., Dialo, H., Ndi, V. N., Neindefoh, L. S., Nkemchap, C. D., & Cockburn, L. (2024). Digital storytelling to promote disability-inclusive research in Africa. *African Journal of Disability (Online)*, 13, 1-10.

Sljivic, H., Sutherland, I., Stannard, C., Ioppolo, C., & Morrisby, C. (2022). Changing attitudes towards older adults: Eliciting empathy through digital storytelling. *Gerontology & Geriatrics Education*, 43(3), 360-373.

Sonday, A. (2021). Digital storytelling as a reflective tool in occupational therapy curriculum. *Occupational therapy international*, 2021(1), 2463916.

Stargatt, J., Bhar, S., Bhowmik, J., & Al Mahmud, A. (2022). Digital storytelling for health-related outcomes in older adults: systematic review. *Journal of Medical Internet Research*, 24(1), e28113.

Stenhouse, R., Tait, J., Hardy, P., & Sumner, T. (2013). Dangling conversations: reflections on the process of creating digital stories during a workshop with people with early-stage dementia. *Journal of psychiatric and mental health nursing*, 20(2), 134-141.

Subramaniam, P., & Woods, B. (2016). Digital life storybooks for people with dementia living in care homes: an evaluation. *Clinical interventions in aging*, 1263-1276.

Tsui, E. K., & Starecheski, A. (2018). Uses of oral history and digital storytelling in public health research and practice. *Public health*, 154, 24-30.

Vaughn, M. P., & Leon, D. (2021). The personal is political art: using digital storytelling to teach sociology of sexualities. *Teaching Sociology*, 49(3), 245-255.

Wexler, L., Gubrium, A., Griffin, M., & DiFulvio, G. (2013). Promoting positive youth development and highlighting reasons for living in Northwest Alaska through digital storytelling. *Health promotion practice*, 14(4), 617-623.

Woods, P., & Ashley, J. (1995). Simulated presence therapy: using selected memories to manage problem behaviors in Alzheimer's disease patients. *Geriatric Nursing*, 16(1), 9-14.

Xu, L., Fields, N. L., Highfill, M. C., & Troutman, B. A. (2023). Remembering the Past with Today's Technology: A Scoping Review of Reminiscence-Based Digital Storytelling with Older Adults. *Behavioral Sciences*, 13(12), 998.

Zaretsky, A., Rodney, H., Morassaei, S., Parker, K., Di Prospero, L., Kalocsai, C., ... & Vanhorn, J. A. (2022). The Out of Darkness Project: innovative multimedia digital storytelling in psychiatry. *Academic Psychiatry*, 46(5), 644-649.

Zhu, D., Al Mahmud, A., & Liu, W. (2024). Digital storytelling intervention for enhancing the social participation of people with mild cognitive impairment: co-design and usability study. *JMIR aging*, 7, e54138.