Talking and reflecting about daily events is important for all individuals, including those with dementia. Jootun and McGhee (2011) state that communication is a fundamental requirement, is essential for survival and growth, gives substance to life, and enhances a sense of belonging. The way in which people communicate is unique and influences the quality of the relationship of those involved. For individuals with dementia, communication becomes a problem due to an impaired capacity of remembering recent events and a deterioration of language functions (aphasia) (American Psychiatric Association [APA], 2000). This gradually causes problems in participating in conversations about daily activities and events (Hydén & Örulv, 2009).

People’s ability in telling stories is important when communicating experiences. According to Hydén and Antelius (2011), storytellers with communicative disabilities (e.g., people with dementia) find ways to present themselves as competent storytellers even if they have problems in vocally presenting a coherent story. Their stories are embodied in a network of social relations, where the teller and the listener make use of what they see as their shared background experience. The listener becomes involved in discussing, revising, and reorganizing stories told, and meaning is constructed through...
the active engagement of all participants in the storytelling event (Hydén & Antelius, 2011). It is therefore important for listeners of stories told by people with dementia to be engaged and understand the important role they have in the storytelling process (Fels & Astell, 2011).

Reminiscence therapy is a method often used among individuals with dementia to maintain their identity and to stimulate conversations about past activities and events (Cappeliez, O’Rourke, & Chadbury, 2005; Subramanian & Woods, 2010) and is a common psychosocial intervention in dementia care. To facilitate daily conversations and storytelling, different prompts, such as photographs, items from daily life, music, and sound recordings, are used (McKeown, Clarke, & Repper, 2006). There are indications that reminiscence has an effect on cognition, mood, and functional capacity; however, no robust evidence exists (Woods, Spector, Jones, Orell, & Davies, 2005).

An increasing development in information technology offers new and more advanced opportunities to work with reminiscence of personal events for people in the early stages of dementia living in their own homes. Examples are multimedia life story support (Damianakis, Crete-Nishihata, Smith, Baecker, & Marziali, 2010; Hanson et al., 2007; Yasuda, Kuwabara, Kuwahara, Abe, & Tetsuani, 2009) and the use of a touch screen with a range of stimuli to prompt reminiscing (Astell et al., 2010). Pictures captured by a smartphone and transformed into a slide show were found to be useful in helping individuals with Alzheimer’s disease increase the number of events remembered and proved to be a valuable tool for those living with persistent memory loss (De Leo, Brivio, & Sautter, 2011). These studies indicate that providing tools to support re-
membrane of recent daily activities and events, thereby facilitating the sharing of these experiences, might enhance the quality of life within the couplehood. Although there is an increasing development of devices to support remembrance and facilitate conversations, the empirical support for effect on memory functions is limited (Gillespie, Best, & O’Neill, 2012).

Hence, we need to develop an understanding about the use of digital photography tools to support remembrance of and conversation about recent daily activities and events for individuals with dementia. Therefore, the aim of the current case study was to explore the process of acceptance and integration of a digital photograph diary (DPD) as a tool for remembrance of and conversation about daily life events among individuals with dementia and their family members.

METHOD

The study design is an explorative multiple case study (Yin, 2009) of an intervention using multiple data collection methods.

Participants

The inclusion criteria for the participants were a diagnosis of Alzheimer’s disease, a score between 17 and 25 on the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975), lived in their own homes, and had a spouse or other family member willing to participate in the study. Ten couples, each including an individual with Alzheimer’s disease and his or her family member (N = 20 participants), were recruited through health care institutions and advertisements in local newspapers in northern Sweden. Three couples dropped out in an early stage of the study process. In all, data from seven couples are included in the analysis (N = 14 participants). In one couple, the family member was the daughter and in the remaining pairs, it was the spouse. One participant dropped out before being screened in the last data collection session.

Intervention

The DPD was developed in the MemoryLane project (http://www.memorylane.nu) and consisted of three parts: (a) a SenceCam (Figure 1A), which automatically took photographs every 2 minutes; (b) an adapted smartphone (Figure 1B), which through a global positioning system (GPS) function could annotate locations of the pictures; and (c) a home station, which consisted of a computer with an integrated touch screen equipped with specially developed software to review, filter, and sort photographs (Figure 1C).

Individuals with dementia or their family member wore the camera and the smartphone during daily activities and events. The frequency in using the camera was left to each couple to decide. In the evening, the family member connected the camera and smartphone to the computer to upload the information. When reviewing the photographs it was possible to add both a heading and descriptive text, and the photographs were automatically annotated with a date. When reviewing the photographs, the family member was encouraged to ask the person with dementia to narrate the event.

Data Collection and Procedure

One author (E.K.) visited the participants and delivered the DPD. They were given verbal instructions along with a written manual. The family member was also trained to use the DPD. Data were collected in three sequences over a period of 6 months. The first sequence was regarded as a baseline and conducted after 2 weeks of using the DPD, the second after 10 to 12 weeks, and a final after 20 to 22 weeks. Two authors (E.K., S.S.) conducted all data collection jointly, and each data collection session lasted approximately 3 hours. In addition, one author (E.K.) visited the participants on an average of four occasions between the data collection sessions, and between these visits regular contacts were held via telephone.
Interviews
Individual semi-structured interviews were conducted with the person with dementia and his or her family member in all three data collection sessions, covering predefined areas of queries (Patton, 2002, pp. 253-257). Interviews at baseline focused on the participants’ expectations of the DPD and their interest in using it. The interviews in the second and final sequence of data collection focused on the participants’ experiences using the DPD. These interviews with both the individual with dementia and his or her family member covered such areas as frequency of use, when it was interesting to use the DPD, and in what way the photographs contributed to their talks about daily activities. One author (E.K.) conducted interviews with the individuals with dementia, utilizing an approach where concrete questions were asked, related to the present situation (Beuscher & Grando, 2009). One author (S.S.) conducted the interviews with the family members. All interviews were audiorecorded, except for three interviews with individuals with dementia that were recorded manually due to technical reasons.

Observations and Field Notes
Two types of naturalistic observations were documented with field notes by two authors (E.K., S.S.). The first type was the reflected impressions of the participants’ interaction after each visit that were directly discussed, compared between the researchers, and noted in field notes (Patton, 2002, p. 264). The second type of observation was made during the second and final sequence of data collection, when the couples narrated different activities documented in the DPD.

Screening Instruments
Screening instruments to measure cognitive function, well-being, and memory function were used. In the first and final sequence of data collection, the MMSE (Folstein et al., 1975), Philadelphia Geriatric Center Morale Scale (PGCMS) (Lawton, 1975), a computer-based verbal episodic memory test including a two-word list with random words (Wahlin, Bäckman, & Winblad, 1995), and a face recognition test (Burton, Bruce, & Hancock, 1999) were administered. In addition, in the first and last interview, the family member also answered structured questions about degree of well-being of the individual with dementia on a visual analog scale.

Data Analysis
The analyses of different types of data sets were performed stepwise, where the first step was to analyze different data sets for each participant separately. The second step was an integration of all data for each couple, and as a third step, the overall content was integrated and analyzed to find a common pattern of content (Yin, 2009) (Figure 2).

The interviews with the individuals with dementia and their family member were analyzed with a method for qualitative content analysis (Krippendorff, 2004). All interviews were transcribed verbatim and read through several times by one author (E.K.) to obtain a deeper understanding of the content. Thereafter, text units relating to the same question area were identified and condensed. When reading the text, important data beyond the answers of the preformulated areas of query appeared in the text and were also included and condensed (Graneheim & Lundman, 2004). Text units from the interviews of the individuals with dementia and their family member were at first analyzed separately and thereafter merged and analyzed together. The same procedure was repeated with data from all couples. The analysis of the interviews formed a main basis for the interpretation of the result and other data were integrated to enhance the understanding of the experience of using the DPD. Finally, data from each of the couples were integrated and compared in a search for commonalities and differences.

Ethical Considerations
The study was carried out within the framework of the MemoryLane project, which was approved by the Regional Ethical Review Board for research in northern Sweden. Special considerations were taken to ensure that the individuals with dementia expressed interest in participating and together with their family member understood what their participation entailed. They were also informed about their right to withdraw from the project without explanation. All participants gave writ-
ten informed consent to participate, and the researchers were particularly attentive to any signs of stress or reluctance to participate. All collected data (e.g., photographs, logging data) were regarded as strictly personal.

**RESULTS**

Individuals with dementia were between ages 72 and 81, and six lived together with their partner whereas one was a widow. Four couples became regular users and three used the DPD more sporadically. Factors that determined regular and sporadic users are described for each couple (Table). No patterns were identified between cognitive function and usage.

**Process of Acceptance and Integration**

The process of acceptance and integration of the DPD into daily life included factors that had a different impact on each couple (Figure 3). One important factor was the personal motivation to start using the DPD, which was connected to an expected usefulness. Another factor was the ability to learn and understand the function of the DPD, which was facilitated by the practical experience from actual use. Support from the family member was also an important factor as well as the attention from family members and friends and experienced usefulness. Reaching acceptance and integration was an ongoing process, with no start and end.

**Expectations of Usefulness.** In the beginning, almost all of the participants were interested and curious about the DPD. Some of the family members hoped that the DPD could maintain functions and independence of the individual with dementia and promote quality in the couples’ lives. Others were more focused on finding a meaningful shared activity in the present. Among those who became sporadic users, the individual with dementia and/or his or her family member often had vague and unrealistic expectations. For example, one family member had hoped for a technically more advanced device, but when this expectation was not fulfilled he soon lost interest in using it. Another example was a family member who lost interest when the DPD could not help his wife manage her daily activities.

**To Use, Learn, and Understand.** It was obvious that the couples who became regular users were able to learn and understand the function of the device and overcome the threshold where the use of it became a common regular activity. The more the DPD was used, the easier and more interesting it was to use it, and in that process the motivation of the family member was important. The individual with dementia had problems with the abstract thinking of perceiving how the DPD could be used and needed regular use of it to gain experience, learn, and appreciate it. An example was George, who after using the DPD for a longer period stated: “I did not realize why I should have it…. At first I thought it was just for the day…. Now I understand what it is about and the purpose in a longer perspective.”

**Support.** Support from the family member was an important factor for the use of the DPD. The interaction and relationship within the couplehood was essential in the process of acceptance and integration, such as the mutuality in the willingness to use the DPD. An example when mutuality in the interest was never achieved was Bob and Brenda. In the beginning, Bob was very interested stating, “If there is anything that I could do to facilitate Brenda’s situation, I will do it.” His enthusiasm gradually decreased when he realized that his wife was less motivated, and after some time of no interest from her, his interest also faded.

The support from family and friends was also important. One problem was that some of the individuals with dementia were unsure of the responses from other people, connected to a fear of being singled out, which made them insecure and resistant to wear the camera. Level of insecurity seemed to be related to their own acceptance of having dementia and their degree of openness about it. Part of the insecurity was also connected to an uncertainty if individuals they met were uncomfortable about being photographed. An example was Frances, who after receiving comments from people around her during a social event, re-
fused to wear the camera in public again. Another example was Henry, whose major concern in the beginning was what he would answer if anyone posed questions about the camera. He was able to overcome this concern when he received positive responses from others, and due to wearing the camera, he was included in conversations in a way that he not had been previously. His wife Hanna described:

All of those [people] we talked to think this is fantastic and are very impressed. This creates an attention around him that has not been there before...you know...when people around discover that a person does not remember or recognize.... Then they lose interest to talk to that person and instead they talk to him through me.

**Experienced Usefulness.** An essential factor in the process of accepting and integrating the DPD into daily life was the experience of usefulness for the remembrance of and conversation about recent daily activities. It seemed as though the photographs facilitated the conversation and the narration about what had happened during the day, even for those who used the DPD more sporadically. Some of the individuals with dementia had difficulties finding words, but the words came more easily when looking at the photographs. An example was Corinne, who, with the assistance of the DPD, could talk about activities in a way that even surprised her husband. Another example was Frances and Henry, both of whom were easily stressed, but while reviewing the photographs were relaxed and could readily narrate relating activities. Hanna described another aspect of usefulness, explaining how the DPD had given

<table>
<thead>
<tr>
<th>Couple</th>
<th>Weeks of Testing</th>
<th>MMSE</th>
<th>PGCMS</th>
<th>Free Recall Memory Index</th>
<th>Recognition Memory Index</th>
<th>Level of Well-Being Estimated by Family Member</th>
<th>Interest of Using the DPD</th>
<th>Interest of Use Estimated by Family Member</th>
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<tbody>
<tr>
<td>Regular users (Several times per week)</td>
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<td>4/–9</td>
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<td>4</td>
<td>22</td>
<td>24/18</td>
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<td>6</td>
<td>20</td>
<td>24/25</td>
<td>6/8</td>
<td>7/5</td>
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<td>7</td>
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<td>Sporadic users (&lt;1x per week)</td>
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<td>25/25</td>
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<td>3</td>
<td>22</td>
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<td>21/19</td>
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<td>3/–9</td>
<td>21/–9</td>
<td>8/5</td>
<td>+/0</td>
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</tbody>
</table>

Note. DPD = digital photograph diary; MMSE = Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975); PGCMS = Philadelphia Geriatric Center Morale Scale (Lawton, 1975). Values reported for individuals with dementia with the exception of “Interest of Using the DPD” column, where bottom values indicate family members’ interest. Maximum value 30, a maximum value 17, a maximum score 48, a maximum score 34; the higher the score, the better result. Scores 0 to 10 (higher score indicates higher level of well-being), + indicates interesting, 0 indicates neither interesting or uninteresting, – indicates not interesting, + missing data.
them a shared daily activity, which felt stimulating for both individuals. Her husband, Henry, was now often in a good mood and was encouraged by having something to do. “He seems happy with life…. He hums to himself so I find him very positive right now…. This has been good for him.”

Glenda described how the dementia had affected the quality of her daily conversations with her husband and said:

Before this [referring to the DPD] we did not talk much. There was no real conversation anymore…not like it was before when we could sit and talk. But now our conversation has improved when we can go back and review what happened during the day.

For many of the couples, the photographs stimulated their conversations, not just about what was shown in the pictures but also initiated stories about people, places, and experiences connected to the photographs.

The conversations about the photographs also contributed to an increased communication between the couples and their family members and promoted their relationship. Anita described: “It felt natural to use it every day in Mother’s case…. Every time we were there the DPD was activated because all of us [children and grandchildren] were interested to look at the photos.” Another aspect of usefulness was that the DPD could serve as a link between the family members in their communication about their mother’s daily activities. Glenda also described how the photographs increased George’s ability to orient his location in the neighborhood: “Sometimes when I want to tell him where certain things are I can start from the photo…and I try to describe to him what he should look out for when he is out walking.”

The experienced usefulness of the DPD was also connected to how the participants perceived their daily lives. Glenda explained, “Even if it does not happen much in everyday life, there is always something worth documenting, which can contribute to our daily conversation.” Among the sporadic users there was a perception that average daily routines were not worth documenting with photographs. They only used the camera during special events (e.g., birthday parties, family dinners). Bob stated, “But then you can just as well use an ordinary camera.”

**DISCUSSION**

The aim of this case study was to explore the process of acceptance and integration of a DPD as a tool for remembrance of and conversation about daily life events among individuals with dementia and their family members. Expectations, the ability to learn and understand, actual use, support, and experienced usefulness were all important factors in this process.

The importance of the phenomenon of acceptance in relation to use of technical devices is well known and studied in many contexts, and the technology acceptance model (TAM) (Davis, 1989, 1993) is widely used to understand it. It focuses on perceived usefulness and perceived ease of use that together will lead to an intention to use the device. The TAM has been developed further among other researchers, and variables related to both human and social factors have been included (Heerink, Kröse, Evers, & Wielinga, 2010; Legris, Ingham, & Collerette, 2003) as well as the possibility to maintain personal independence, mobility (Arning & Ziefle, 2009), and frequency of use (Chiu & Eysenbach, 2010).

Acceptance is connected to an ability to perceive and imagine how something can be used. This requires the capacity for abstract thinking, an ability that declines in dementia (APA, 2000). As a consequence, it becomes difficult to perceive usefulness and ease of use, which is the basis for the TAM theory (Davis, 1989, 1993). One of the participants in this study described how it took him a long time to really understand what the DPD was meant for, but it became clear to him over time when his wife encouraged him to use it. It is reasonable to conclude that to experience the usefulness of such a device as the DPD, the individual with dementia must first be supported in learning and understanding the use by his or her own practical experience. The example shows that it is a necessity to see the implementation of a digital device such as the DPD as a process that requires both time and actual use. These findings are supported in a recent study (Karlsson, Axelsson, Zingmark, & Sävenstedt, 2011), showing there is a need to consider the integration of a digital device into daily life for individuals with dementia as a process, which requires a considerable amount of time as well as active support and encouragement from the family member.

Coupleshood was a prerequisite for participation in the study, and the results enhance the understanding that the interaction within the couplehood was important. Those who became regular users found the photographs captured through the DPD useful and stated that the photographs facilitated their conversations. It was shown in previous studies that providing tools that promote conversations about daily activities

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**There is a need to consider the integration of a digital device into daily life for individuals with dementia as a process, which requires...time as well as active support and encouragement from the family member.**
KEYPOINTS


1. During introduction of new digital devices among people with dementia, communication of the aim and functions as well as how these match the user’s expectations is important.

2. Acceptance and integration of a device such as the digital photograph diary (DPD) is a process that requires time, active support, and experience of use over time.

3. The DPD contributed to increased communication and promoted the relationship between family members.

4. The use of the DPD was perceived as a stimulating joint activity by the individuals with dementia and family members.

REFERENCES


(e.g., DPD) can facilitate and have a positive effect on relationships (Astell et al., 2010; Stenhousse, Tait, Hardy, & Sumner, 2013). To share experiences by talking about them gives an opportunity for self-expression, which might enhance feelings of confirmation and appreciation. Hellström, Nolan, and Lundh (2007) described how open communication, affection, appreciation, and making the best of the situation by living day to day are important for a sustained couplehood where one individual has dementia. It can be assumed that this also contributes to the individual with dementia preserving his or her self-image.

The DPD captures photographs from recent daily activities in contrast to most research and development of multimedia reminiscence tools, which support remembrance of previous events and episodes in life (Damianakis et al., 2009). There is research in the area of so-called life-logging to support remembrance of recent daily activities (Kalnikaité & Whittaker, 2011; Lindley, Glancy, Harper, Randall, & Smyth, 2011; Sellen et al., 2007), even if most of these studies are conducted among individuals without memory deficits. However, there is also some ongoing research evaluating life-logging among individuals with early-stage dementia (Piasek, Irving, & Smeaton, 2011). The research field of life-logging is in its infancy and more research is needed, as well as research about the process of acceptance and integration of digital devices into daily life among individuals with dementia.

METHODOLOGICAL CONSIDERATIONS

The design of the study allowed the researchers to gather data from different perspectives and evaluate the complexity of using the DPD in the context of the participants’ daily life (Yin, 2009). Using multiple sources of data enhanced credibility. There is a challenge in conducting research involving individuals with dementia. Two authors (E.K., S.S.) were both present during all of the data collection and had recurrent discussions where these challenges were reflected on. Multiple sources of data also made the analysis more complex. To handle this challenge, the analysis was made stepwise to ensure rigor. Regular discussions were also held among the whole research group. This approach strengthened credibility in all phases of the study. A limitation in the study was the number of participants and drop-out of data. This was to some extent compensated by extensive data collection over a longer time period.

CONCLUSION

The results show that acceptance and integration of digital devices such as the DPD into daily life is a circular process influenced by several factors. Conclusions from this knowledge are that it is important to ensure that the person with dementia is well informed about the functions and the aim of the device and encouraged by the family member to use it. The use of digital devices such as the DPD for individuals with dementia to support remembrance of daily events is an important area that will have implications in nursing care. It will facilitate the support of people with dementia and benefit their reminiscence of daily events to enhance the interaction with family members or care staff. The digital devices have a potential to support caregivers to converse, develop, and maintain a relationship with the person with dementia, rather than simply keeping them entertained.


