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DailyCare: A Caregiver-Mediated Reminder System for Everyday Dementia Care

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Abstract

Purpose: DailyCare is an accessible assistive technology designed to support people with cognitive impairment and their caregivers in everyday routines. This study examined whether a caregiver-mediated, chatbot-based reminder system was understandable, acceptable, and meaningful in everyday dementia care.

Methods: An exploratory mixed-methods evaluation was conducted with 17 participants: 9 people with cognitive impairment and 8 caregivers, most of whom were family members. DailyCare combined a caregiver-facing planning interface with a patient-facing structured chatbot. Data were collected through adapted questionnaires on technology anxiety/confidence and technology acceptance, a secondary usability benchmark for the caregiver-facing interface, satisfaction measures, usage diaries, and semi-structured interviews, and were analysed descriptively, with qualitative data reviewed for recurrent themes.

Results: Patients reported low technological anxiety, good comprehension of chatbot messages, high enjoyment of reminders, and high overall satisfaction, although perceived usefulness was more heterogeneous. Caregivers evaluated the system positively, particularly for daily planning, and valued the possibility of configuring reminders, monitoring task completion, and adding personalized reinforcement. Across both groups, caregiver mediation emerged as central: caregivers selected routines, adapted prompts, and associated reminders with familiar messages, images, audio, or other reinforcement elements.

Conclusion: DailyCare was accepted as a low-load reminder system that supports everyday routines through caregiver-authored personalization. The findings suggest that reminder systems for dementia care should be designed not only for task delivery, but also around caregiver mediation, accessible interaction, and personalized reinforcement that is meaningful within the care relationship.

Keywords: assistive technology; dementia care; caregivers; chatbots; accessibility; technology acceptance

1 Introduction

Dementia is one of the main challenges of ageing societies. The World Alzheimer Report 2024 [1] shows that public understanding remains limited: 80% of the public and 65% of healthcare professionals still believe that dementia is a normal part of ageing. The same report also highlights persistent stigma and discrimination, reported by 88% of people living with dementia and by more than half of caregivers. These figures underline the need for supportive and inclusive interventions that address not only clinical needs but also autonomy, daily participation, and social connection.

Assistive technologies and mHealth applications can support independence, daily routines, communication, and caregiver burden management. However, reviews of dementia-related applications describe a fragmented field, with many systems focused on isolated functions such as cognitive training, monitoring, socialization, or task management. Adoption and sustained use remain limited by complexity, poor usability, lack of personalization, and weak fit with everyday care routines [2]. Qualitative and co-design studies also show that caregivers need tools that are simple, contextualized, and aligned with health literacy and daily care practices [3, 4].

Reminder-based applications are relevant in this context, but they often frame support as a scheduling problem. In dementia care, however, reminders are not neutral instructions. They are part of a relationship in which caregivers help patients to understand, accept, and carry out daily activities. Assistive technologies should therefore not only deliver tasks at the right time; they should also make those tasks understandable, familiar, and acceptable for the person receiving them.

DailyCare was designed within this problem space. It is an accessible assistive system that combines a caregiver-facing planning interface with a patient-facing chatbot. Caregivers configure routines and reminders and associate them with personalized messages, images, audio, or positive reinforcement, while patients receive these prompts through a simple conversational interface that requires minimal interaction. A previous exploratory study with people with acquired brain injury and their caregivers provided initial evidence about the system and identified relevant barriers, including digital literacy, disease acceptance, and sustained chatbot use [5].

The present paper reports a new exploratory evaluation of DailyCare in a community dementia-care context, involving people with cognitive impairment and caregivers. The study addresses three research questions: (RQ1) how patients and caregivers accept a low-load chatbot-based reminder system in everyday dementia care; (RQ2) how caregivers mediate the configuration, contextualization, and use of the system; and (RQ3) whether personalized and reinforcement-based reminders contribute to perceived companionship and caregiver–patient relational support.

This article makes three contributions. First, it reports an exploratory mixed-methods evaluation of DailyCare with 9 people with cognitive impairment and 8

caregivers in a community dementia-care setting. Second, it analyses initial acceptance through complementary dimensions, including technology anxiety/confidence, perceived usefulness, perceived ease of use, satisfaction, usage diaries, and interviews. Third, it introduces mediated relational care as a design insight for dementia-care technologies: caregivers author and contextualize daily routines, while patients receive them through short, accessible, and personalized interactions.

The remainder of this paper is structured as follows. Section 2 reviews the background and positions the DailyCare approach. Section 3 describes the DailyCare system and summarizes the previous exploratory study that informed the present evaluation. Section 4 presents the community-based evaluation. Section 5 reports the results. Section 6 discusses the findings, and Section 7 presents the conclusions and future work.

2 Background

This section reviews previous research relevant to the design and evaluation of DailyCare. It focuses on four areas directly related to the system: assistive technologies for dementia care, everyday routines, conversational interaction, and cognitive accessibility. A final subsection synthesizes these strands and situates the DailyCare approach.

2.1 Assistive Technologies in Dementia Care

Assistive technologies for dementia care support memory, daily routines, communication, monitoring, and caregiver support. Mobile health applications are especially relevant because they can be used in everyday settings by both people with dementia and their caregivers. However, previous reviews describe a fragmented field: many applications focus on isolated functions, while adoption and sustained use remain limited by usability barriers, lack of personalization, weak long-term evidence, and poor fit with everyday care routines [2, 6].

Recent reviews confirm both the potential and the limitations of digital assistive technologies in dementia care. They may support community living, social health, independence, and quality of life, but challenges remain in personalization, usability, implementation, ethics, equitable access, and empirical validation [7]. HCI-oriented reviews similarly group dementia-care technologies around daily-life support, social interaction and communication, well-being, and caregiver support [8]. Reviews of intelligent assistive devices, including sensors, robots, mobile applications, and smart-home technologies, also describe a promising but unevenly evaluated field [9].

Caregiver-oriented applications show the same pattern. Reviews identify functions such as tracking, task management, monitoring, education, communication, and caregiver mental health support, but also report few comprehensive solutions and limited evidence of long-term engagement [6]. Qualitative and co-design studies further show that dementia care involves practical needs, such as hygiene, meals, medication, appointments, and reassurance, and that caregivers value applications that are simple, contextualized, and aligned with their routines and health literacy [3, 4].

Caregivers are therefore central to adoption. They often determine whether a technology is tried, how it is configured, how it is interpreted, and whether it becomes part of everyday care [10]. Dementia-care technologies should therefore be designed not only around patient interaction, but also around the practical and relational work carried out by caregivers.

2.2 Everyday Routines in Dementia Care

Participation in everyday activities is not only a matter of functional independence. In dementia care, routines are also linked to identity, agency, self-esteem, dignity, and continuity of the person. Person-centred dementia care therefore stresses the preservation of personhood, preferences, meaningful relationships, and the social context in which the person is recognized and supported [11]. From this perspective, technologies should not only compensate for memory or executive-function difficulties, but also help people remain involved in familiar routines and interactions.

This concern is also reflected in research on mobile technologies for dementia. Koo and Vizer argue that many mobile solutions address basic physiological and safety needs, while higher-level needs such as self-esteem, agency, and personhood receive less attention [12]. This is especially relevant for reminder-based systems. A reminder may serve as a cue, but it may also be experienced as an invitation to participate in a familiar routine, complete a meaningful activity, or receive recognition from another person. This is why reminder systems for dementia care require more than accurate timing: they must also account for comprehension, emotional response, motivation, and the social meaning of the prompted activity [13, 14].

Personalized multimedia content can help address this broader requirement. Studies on personalized reminiscence technologies show that familiar images, music, and biographical materials may support subjective well-being, mutuality, and caregiver–patient relationship quality [15]. Recent work on music technologies in everyday dementia care similarly shows that familiar media can support mood regulation, joy, social connection, reminiscence, continuity, and easier caregiving practices [16]. These findings suggest that familiar and personalized content can turn functional prompts into more acceptable and relationally meaningful forms of support.

2.3 Conversational Interaction

Conversational agents have attracted attention in dementia care because they may reduce the interaction demands of conventional interfaces and provide a familiar communication channel. However, the evidence remains limited. Reviews of chatbots and embodied conversational agents describe an emerging field with persistent weaknesses in setup, interaction design, language handling, evidence-based content, end-user evaluation, and ecological validation [17, 18].

The broader literature on conversational agents for older adults also supports a cautious design approach. Recent reviews show growing interest in chatbots and voice assistants for health-related support, but also report barriers related to acceptance, perceived loss of independence, privacy concerns, unstable effects, and insufficient personalization or user control [19, 20]. In dementia care, this means that conversational

interaction should not become cognitively demanding, unpredictable, or difficult to correct.

Patient-facing agents provide useful lessons in this regard. The embodied conversational agent Anne showed engagement and some sense of companionship in home settings, but speech-recognition problems reduced usefulness, trust, and intention to use, while touch interaction appeared more stable [21]. Other systems focus mainly on caregivers. HIGEA uses conversational interaction to detect caregiver burden over time [22], and CareHeroes combines educational content, clinical information sharing, caregiver self-assessments, and a chatbot, although larger-scale evaluation is still needed [23].

Conversational agents have also been studied from a dyadic perspective. Work with older adults with mild cognitive impairment and their care partners showed that these agents can support shared routines when they reduce memory demands and allow flexible interaction, but also highlighted common voice-interface problems such as command syntax, misrecognition, and output pacing [24]. Overall, the literature suggests that conversational support is promising, but that systems for dementia care require predictable interaction, clear confirmations, and robust fallback options.

2.4 Cognitive Accessibility

Accessibility is a core requirement for technologies aimed at people with cognitive impairment. Standards such as EN 301 549 and WCAG provide a baseline for accessible ICT and web content [25, 26], but cognitive accessibility also requires attention to comprehension, memory load, attention, predictability, error prevention, and user involvement. The W3C COGA guidance emphasizes clear structure, understandable content, simple interaction steps, support for memory limitations, and the involvement of users with cognitive and learning disabilities in design and evaluation [27]. Plain-language principles are also relevant, since task descriptions, conversational prompts, and caregiver-facing instructions need to be clear, concise, and easy to act upon [28].

Research on technologies for community-dwelling people with dementia similarly highlights usability, user involvement, deployment conditions, ethical issues, and real-world support [29]. Co-design research further stresses that people with dementia should be involved in technology design whenever possible, and that design processes should account for their abilities, preferences, communication needs, and everyday contexts [30]. These factors are especially relevant in everyday settings, where assistance may be intermittent and where errors, confusion, or notification overload can reduce acceptance.

For reminder-based systems, accessibility concerns not only interface compliance but also the way tasks are expressed, delivered, confirmed, and framed. A reminder may be technically accessible but still ineffective if it is too complex, impersonal, or disconnected from the person's everyday context. Accessible interaction in dementia care therefore requires predictable flows, reduced interaction demands, plain-language content, simple response options, and personalization that reflects the user's routines and preferences.

2.5 The DailyCare Approach

The literature reviewed above points to four recurring requirements for dementia-care technologies: support for everyday routines, active caregiver involvement, low-load and accessible interaction, and personalization beyond simple scheduling. However, previous work often addresses these dimensions separately. Assistive and mHealth systems remain fragmented or focused on isolated functions [2, 6, 7]; reminder technologies emphasize prompting and task completion [13, 14]; personalized media is often studied outside routine management [15, 16]; and conversational agents still face limitations in robustness, predictability, and end-user evaluation [17, 18, 21].

DailyCare is designed at the intersection of these lines of work. It combines a caregiver-facing planning interface with a patient-facing structured chatbot. Caregivers select and contextualize routines, link them to familiar messages or multimedia reinforcement, and monitor completion and satisfaction. Patients receive short, predictable, plain-language prompts through a low-load conversational interface. In this model, the caregiver remains the author of the routine, while the system acts as a delivery channel for more accessible and contextually meaningful prompts. Table 1 summarizes the main research gaps identified in the literature and the corresponding elements of the DailyCare approach.

Table 1 Research gaps addressed by the DailyCare approach.

Research strand	**Prior work**	**Identified gap**	**DailyCare**
Assistive and mHealth	Monitoring, task management, communication, and caregiver support [2, 6, 7].	Systems are often fragmented and weakly integrated into everyday caregiver–patient routines.	Integrates planning, reminders, monitoring, and feedback in one dyadic workflow.
Routine and memory support	Prospective memory, task completion, and independence [13, 14].	Reminders are often treated as timed prompts, with limited attention to personal meaning and relational context.	Treats reminders as caregiver-authored prompts embedded in everyday routines.
Personalized multimedia	Familiar images, music, and biographical content for well-being and connection [15, 16].	Personalized media is often studied separately from routine management and task completion.	Links multimedia reinforcement to specific daily tasks.
Conversational agents	Chatbots, embodied agents, and voice assistants for support and companionship [17, 18, 21, 24].	Open-ended or voice-based interaction can be cognitively demanding and technically fragile.	Uses a structured, low-load chatbot with predefined responses.
Cognitive accessibility	Clear content, predictable interaction, plain language, and user involvement [25–30].	Accessibility is often treated as interface compliance rather than as part of task delivery and confirmation.	Combines plain-language tasks, predictable flows, simple responses, and caregiver-authored personalization.

Taken together, the DailyCare approach can be understood as a form of mediated relational care: reminder-based support is embedded in shared routines, caregiver-authored personalization, and accessible interaction rather than delegated to an autonomous conversational agent.

3 System Overview: DailyCare

DailyCare is an accessible assistive system designed to support everyday routines in people with cognitive impairment while enabling active caregiver involvement. Its conceptual design and first implementation were reported in previous work with people with acquired brain injury and their caregivers [5]. In the present study, the system is examined in a dementia-care context, with particular attention to simplicity, caregiver mediation, and personalized reminder delivery.

The current prototype builds on earlier design work and on co-design sessions with professionals in cognitive and psychosocial care [5]. The resulting system combines a caregiver-facing configurator with a patient-facing chatbot and is intended as a lightweight solution for structuring routines, delivering reminders, and reinforcing task completion.

3.1 Architecture

DailyCare follows a modular architecture composed of a front-end layer, back-end services, and external data and messaging services, as shown in Figure 1. The front end includes the web/mobile configurator used by caregivers and supervisors and the Telegram-based chatbot used by patients. The back end includes the DailyCare API, the Task and Notification Manager, and the Telegram Bot Service. External services include the CMS, the database, and the Telegram Bot API.

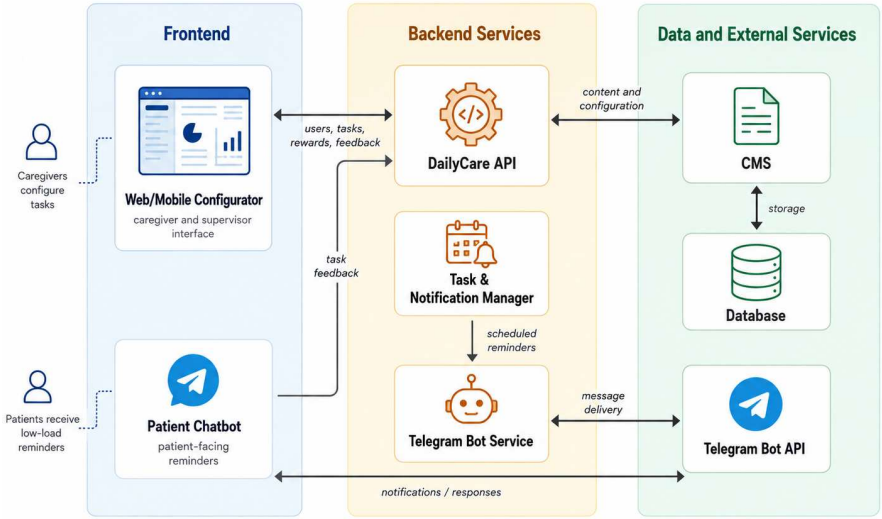


Fig. 1 Architecture of the DailyCare system.

This architecture reflects the dyadic design of DailyCare. Caregivers configure and personalize routines through the configurator, while patients receive short prompts through the chatbot. Supervisors may support caregivers, oversee several users or caregiver–patient dyads, and export usage data for follow-up or analysis.

3.2 Frontend

The frontend provides two connected interfaces: the caregiver/supervisor configurator and the patient chatbot.

The caregiver configurator is a responsive web application accessible from smartphones, tablets, or desktop devices. It allows caregivers to create, edit, and schedule tasks, associate tasks with reinforcement elements, consult a calendar, and review summaries of task completion and patient feedback. The interface follows a mobile-first design with large buttons, simple navigation, and clearly visible actions. The task module includes a search field and a scrollable list of predefined activities, allowing caregivers to select relevant routines without writing all content from scratch.

The prototype includes a predefined catalogue of 35 everyday activities based on dementia-care guidance and daily living documentation, including materials from the Pasqual Maragall Foundation[1]. The catalogue covers self-care, meals, household routines, physical activity, leisure, social contact, cognitive stimulation, and rest. Examples include washing, brushing teeth, getting dressed, having breakfast, going for a walk, calling someone, playing cards, drawing, doing exercise, looking at photographs, listening to music, doing crosswords, caring for plants, watching television, showering, and going to bed.

Each activity is associated with a short task description intended for delivery through the chatbot. These descriptions were written as brief, concrete, action-oriented instructions. The task descriptions and chatbot messages were prepared in plain language by AMAS Fácil, the cognitive accessibility unit of Fundación AMÁS[2], and tested with people with cognitive disabilities.

Caregivers can also associate reinforcement elements with each task. These may include short text messages, photographs, audio recordings, videos, or other familiar multimedia content. Reinforcement elements can be linked to one or more tasks and delivered after task completion. The summary interface shows completed and non-completed tasks over selectable periods and includes a simple satisfaction indicator with three categories: good, regular, and bad. This allows caregivers to monitor not only whether activities were performed, but also how they were experienced by the patient.

The patient interface is implemented through the Telegram chatbot, named “Pili” in the prototype. The chatbot sends task notifications, presents short instructions, and offers predefined response options. Patients can confirm task completion, postpone the task, or provide simple feedback about the experience. When a task is completed, the chatbot can send a congratulatory message, emoji, image, audio, or video selected by the caregiver.

Chatbot messages are generated from templates that combine the patient’s name, the task name, and the simplified task description. This structure was intended to make reminders direct, personal, and easy to understand. The chatbot follows a structured, template-based interaction model rather than an open-ended dialogue. No open-ended natural language understanding is required in the current prototype. This design choice

[1] https://blog.fpmaragall.org/
[2] https://www.fundacion-amas.org/

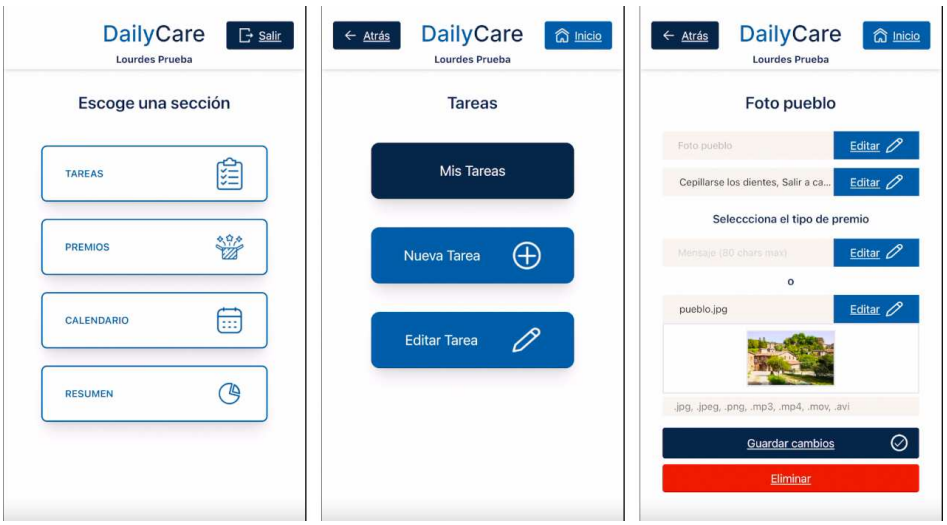


Fig. 2 DailyCare UI: caregiver dashboard.

was intended to increase predictability, reduce interaction errors, and keep cognitive demands low.

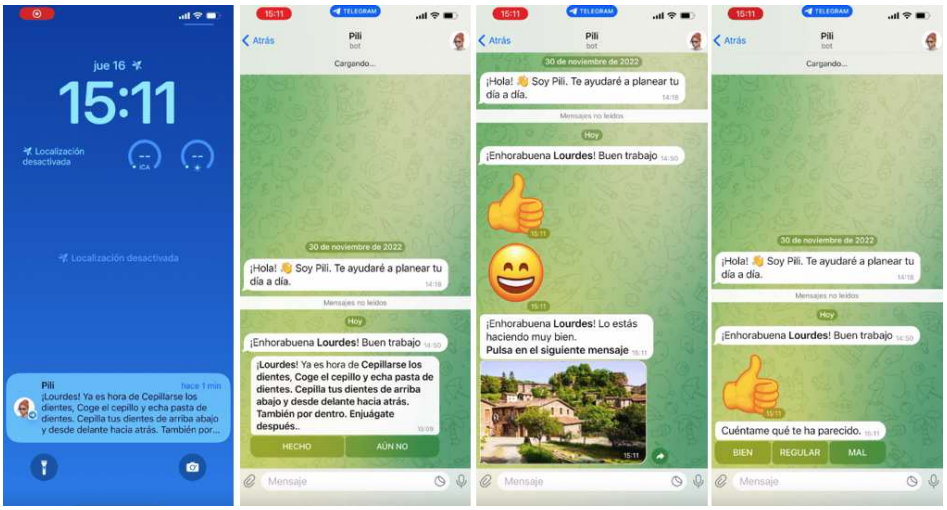


Fig. 3 DailyCare UI: chatbot for patient communication.

3.3 Backend

The backend manages the information required to configure, schedule, deliver, and monitor daily routines. It stores user profiles, caregiver–patient associations, tasks,

schedules, plain-language descriptions, reinforcement elements, chatbot messages, task completion status, postponements, and satisfaction feedback.

The DailyCare API connects the caregiver configurator with the content management and storage services. When a caregiver creates or edits a task, the backend stores the task description, schedule, and associated reinforcement content. The Task and Notification Manager then determines when each reminder should be delivered. The Telegram Bot Service and the Telegram Bot API are used to send reminders, collect patient responses, and return interaction data to the system.

This modular backend supports deployment in different contexts, including family use, community associations, or care organizations. It also allows future extensions, such as voice-based interaction, adaptive personalization, professional monitoring, or alerts based on task completion and satisfaction data.

3.4 Workflow

The interaction begins when the caregiver selects or creates a task in the configurator. The task includes a description, a schedule, and, when appropriate, personalized reinforcement content. Once the task is saved, the system stores it in the backend and schedules the corresponding reminder.

At the selected time, the chatbot sends a notification to the patient. The patient opens the message, reads the prompt, and responds through simple interaction options. If the task is completed, the chatbot can deliver the associated reinforcement element. If the patient postpones the task or does not respond, the interaction is recorded so that it can be reviewed later by the caregiver or supervisor.

This workflow reflects the mediated nature of DailyCare. The chatbot does not replace the caregiver and does not decide which activities are important. Instead, it acts as a delivery channel for caregiver-authored routines. The caregiver provides the personal and contextual information; the system translates it into short, accessible, and timely prompts for the patient.

3.5 Accessibility

DailyCare was developed in accordance with international accessibility standards. The design complies with the requirements established in EN 301 549 and aligns with the Web Content Accessibility Guidelines [25, 26]. Beyond general accessibility compliance, the system follows recommendations for people with cognitive and learning disabilities, including clear structure, reduced interaction steps, predictable feedback, simple language, and support for memory limitations [27]. Task descriptions and chatbot prompts were also adapted according to plain-language principles [28].

Accessibility was addressed at three levels. At the interface level, the system uses simple menus, large actionable elements, short messages, and predefined response options. At the content level, task descriptions are brief, concrete, and action-oriented. At the interaction level, reminders are personalized with the patient's name and may be reinforced with familiar multimedia content selected by the caregiver.

Together, these design decisions operationalize the main principle of DailyCare: caregivers configure and personalize daily routines, while patients receive them as simple, familiar, and supportive conversational prompts.

3.6 Previous Exploratory Study

Before the present evaluation study, DailyCare was assessed in a previous exploratory study conducted at Fundación Jiménez Díaz University Hospital[3] in Madrid, Spain, with seven patient–caregiver dyads. The study examined the feasibility of the system in a hospital setting and provided initial evidence on acceptance, perceived usefulness, and barriers to use [5].

The main finding was a clear divergence between caregivers and patients. Caregivers evaluated the application positively, particularly for structuring daily activities and supporting care management, whereas patient engagement with the chatbot was more limited. Importantly, this lower engagement should not be interpreted only as a usability problem. In several cases, participants were in an early period of disease acceptance and tended to reject tools perceived as being associated with the disease itself. Other barriers included low digital literacy, obsolete devices, and notification problems. At the same time, some participants responded positively to reinforcement messages, suggesting that personalization and emotional support were relevant design directions.

These findings informed the present study in three ways: they highlighted the need to recruit participants with suitable devices and a minimum level of digital familiarity, to balance necessary and motivating routines, and to preserve a predictable, low-load interaction model while considering future voice-based extensions.

4 Community-Based Evaluation

Following the previous exploratory study, a new evaluation was conducted in collaboration with AFADE, an association dedicated to advising and promoting the interests of people with Alzheimer's disease and other dementias, at Hospital Gómez Ulla in Madrid, Spain[4]. The aim was to assess the acceptance and use of DailyCare in an everyday dementia-care context. The evaluation focused on three aspects: (i) initial acceptance of a low-load chatbot-based reminder system, (ii) the role of caregivers in configuring and contextualizing reminders, and (iii) the perceived value of personalized reinforcement and companionship-oriented interaction.

4.1 Research Design

The study followed an exploratory mixed-methods design, combining quantitative descriptive analysis with qualitative data from usage diaries and semi-structured interviews. The objective was not to conduct a confirmatory trial, but to examine whether the system was understandable, acceptable, and usable in a real-world community context, and to identify design implications for dementia-care technologies.

[3] https://www.fjd.es/
[4] https://www.afade.org/

The study was guided by three research questions:

- **RQ1**: How do people with cognitive impairment and caregivers accept a low-load chatbot-based reminder system in everyday dementia care?
- **RQ2**: How do caregivers mediate the configuration, contextualization, and use of the system?
- **RQ3**: How are personalized reminders, multimedia reinforcement, and chatbot-based interaction perceived in relation to companionship and caregiver–patient relational support?

4.2 Participants

The study involved 17 participants: 9 people with cognitive impairment and 8 caregivers, most of whom were family members. Patients were older adults (M = 77.3), predominantly male, with diagnoses mainly of Alzheimer's disease, mild cognitive impairment, or Lewy body dementia. Most had a regular caregiver, typically a spouse or child, and the majority were unfamiliar with mobile applications or Telegram before the study.

Caregivers were mostly women (M = 61.6), often spouses or children, and three out of four identified themselves as the primary caregiver. Although nearly all caregivers used smartphones, most had not previously used applications to organize daily care. Table 2 summarizes the sociodemographic and technology-use profile of both groups.

4.3 Instruments

A combination of quantitative and qualitative instruments was used to assess initial acceptance, technological anxiety and confidence, satisfaction, and perceived emotional experience.

- **Sociodemographic questionnaires** collected data on age, gender, education, diagnosis, technology use, autonomy, cohabitation, and caregiving role.
- **Adapted technology anxiety and trust questionnaire** (hereafter, TATT). Items were adapted from previous work on technology readiness, trust in automated systems, computer anxiety, and technostress [31–34]. The questionnaire assessed anxiety, confidence, perceived need for assistance, clarity of communication, and comfort. Lower anxiety and greater confidence were interpreted as a more positive experience. Patients completed a simplified version embedded in the chatbot, while caregivers responded through the application.
- **Adapted Technology Acceptance Model (TAM)**. TAM items were adapted to measure perceived usefulness, perceived ease of use, enjoyment, attitude, and intention to use [35–37]. Items were tailored to each group: chatbot comprehension and interaction for patients, and task configuration and monitoring for caregivers. For caregivers, TAM items were scored on a 1–7 Likert scale, with higher scores indicating more positive evaluations.
- **Plain-language adaptation of the System Usability Scale (SUS)**. SUS was used as a secondary usability benchmark, mainly for the caregiver-facing interface [38, 39].

Table 2 Sociodemographic and technology-use profile of participants.

Dimension	Patients (n=9)	Caregivers (n=8)
Age	65–87 years (M = 77.3)	30–87 years (M = 61.6)
Gender	77.8% men (n=7); 22.2% women (n=2)	75.0% women (n=6); 25.0% men (n=2)
Diagnosis	Alzheimer's disease 55.6%; mild cognitive impairment 33.3%; Lewy body dementia 11.1%	—
Education	33.3% higher education; 33.3% secondary; 22.2% primary; 11.1% incomplete primary	Heterogeneous; not systematically recorded
Care context	88.9% had a regular caregiver, mainly spouse or child	75.0% identified themselves as primary caregiver
Relationship to patient	—	50.0% wives; 25.0% children; 12.5% husbands; 12.5% volunteers
Cohabitation	Not systematically recorded	62.5% cohabited with the patient
Technology use	66.7% calls and apps; 22.2% calls only; 11.1% no smartphone use	87.5% calls and apps; 12.5% calls only
Device type	100% Android	75.0% Android; 25.0% iPhone
Familiarity with Telegram	88.9% unfamiliar before the study	Mostly unfamiliar before the study
Use of care-related apps	—	62.5% had not previously used apps to organize care

- **Satisfaction questionnaire**. A final questionnaire captured overall satisfaction, perceived support, willingness to continue, and suggestions for improvement, using a 1–5 Likert scale and open-ended responses.
- **Usage diaries**. During the trial, participants recorded completed tasks, incidents, assistance needs, emotional reactions, and spontaneous comments.
- **Semi-structured interviews**. End-of-study interviews explored perceived usefulness, accessibility, emotional experience, barriers, and the mediating role of caregivers.

The adapted TAM items, the adapted TATT questionnaire, and the satisfaction questionnaire are provided in Appendix A.

4.4 Procedure

The study was approved by the Research Ethics Committee of Universidad Carlos III de Madrid under the title "Sistema para la mejora de la autonomía de las personas con discapacidad cognitiva" [System for improving the autonomy of people with cognitive disabilities] (reference CEI23_09_MORENO_Lourdes). Participants received information about the study objectives, procedures, data treatment, and their right to withdraw at any time. Written informed consent was obtained from all participants

and/or their legal representatives, as applicable. Data were pseudonymized and stored in encrypted repositories accessible only to the research team.

The evaluation was organized in five phases:

1. **Enrolment and consent.** Participants received information about the study, signed consent forms, and were assigned pseudonymized identifiers.
2. **Training.** Caregivers were trained to configure DailyCare, define personalized tasks, and associate reinforcement elements such as images, audio, or video. Patients were introduced to the "Pili" chatbot and oriented to respond through simple Telegram interactions.
3. **Trial period.** The system was used for two consecutive weeks. During this period, caregivers scheduled daily activities such as medication, hygiene, meals, exercise, and appointments, and patients received reminders through the chatbot and could confirm or postpone tasks.
4. **Monitoring and support.** Participants completed usage diaries and received follow-up support, either in person or remotely, to resolve technical issues and monitor adherence.
5. **Post-trial evaluation.** At the end of the trial, questionnaires were administered and semi-structured interviews were conducted with patients and caregivers.

4.5 Data Analysis

Quantitative data were analysed descriptively due to the exploratory nature of the study and the small sample size. Percentages were calculated for categorical responses, and means and standard deviations were calculated for Likert-scale items when appropriate. Results were analysed separately for patients and caregivers because each group interacted with a different component of the system and responded to adapted instruments.

Qualitative data from diaries and interviews were reviewed to identify recurrent themes related to comprehension, anxiety, ease of use, perceived usefulness, caregiver mediation, personalization, emotional response, and suggestions for improvement. Quantitative and qualitative findings were then triangulated to identify cross-group patterns and design implications.

5 Results

Results are presented separately for patients and caregivers, as each group interacted with a different component of DailyCare. Patients used the chatbot, whereas caregivers used the configuration and monitoring application. The results are interpreted descriptively, given the exploratory nature of the study and the small sample size.

5.1 Patients

Patients reported generally positive experiences with the chatbot. According to the adapted TATT questionnaire, none of the patients reported feeling confused or anxious when using the chatbot. In addition, 77.8% stated that they always understood its

messages, and 77.8% indicated that they could use the chatbot without assistance. All patients reported that they enjoyed receiving reminders.

However, perceived usefulness was more heterogeneous. While 33.3% of patients felt that the chatbot was useful in daily life and 22.2% reported that it was sometimes useful, 44.4% did not perceive it as clearly useful. This suggests a distinction between affective acceptance and perceived functional value: patients could understand and enjoy the interaction even when they did not always consider the chatbot necessary or useful for their daily routines.

Overall satisfaction was high, with 88.9% rating their experience 4–5 out of 5, and 77.8% expressing willingness to continue using DailyCare. Qualitative responses highlighted the clarity and warmth of the chatbot messages, as well as the perceived value of receiving reminders in a familiar and supportive tone. Suggested improvements included adding voice interaction and increasing conversational flexibility. Table 3 summarizes patient acceptance and experience.

Table 3 Patient acceptance and experience with the chatbot.

Dimension	**Result (n=9)**
Confusion or anxiety when using the chatbot	0% reported confusion or anxiety
Message comprehension	77.8% always understood the messages
Independent use	77.8% reported being able to use the chatbot without assistance
Enjoyment of reminders	100% enjoyed receiving reminders
Perceived usefulness	33.3% yes; 22.2% sometimes; 44.4% no
Overall satisfaction	88.9% rated the experience 4–5/5
Willingness to continue	77.8% would continue using DailyCare
Interest in voice interaction	Most participants expressed interest in voice-based interaction

5.2 Caregivers

Caregivers also evaluated DailyCare positively. According to the adapted TATT questionnaire, 87.5% reported no anxiety when using the application, and 62.5% felt confident operating it without external help. TAM-related scores showed high perceived ease of understanding (M = 6.1/7, SD = 0.9) and ease of learning (M = 5.6/7, SD = 1.2), both in the upper range of the scale.

Caregivers rated the system especially highly for daily planning (M = 6.6/7, SD = 0.5), also in the upper range of the scale. However, usefulness for task organization

received a lower score (M = 4.5/7, SD = 1.1), indicating a more moderate evaluation. This suggests that caregivers perceived DailyCare more strongly as a lightweight planning and reminder-support tool than as a complete task-management solution.

Satisfaction was high, with 87.5% indicating willingness to continue using the system. Qualitative responses suggested that caregivers valued the possibility of configuring reminders, monitoring task completion, and adding personalized reinforcement. Messages, images, congratulatory notes, and voice recordings were perceived as useful ways to increase patient engagement and make reminders more familiar. Table 4 summarizes caregiver acceptance and experience.

Table 4 Caregiver acceptance and experience with the application. Higher TAM scores indicate more positive evaluations on a 1–7 scale.

Dimension	**Result (n=8)**
Anxiety when using the application	87.5% reported no anxiety
Confidence without external help	62.5% felt confident using it without help
Ease of understanding (PEOU)	M = 6.1/7 (SD = 0.9)
Ease of learning (PEOU)	M = 5.6/7 (SD = 1.2)
Usefulness for daily planning	M = 6.6/7 (SD = 0.5)
Usefulness for task organization	M = 4.5/7 (SD = 1.1)
Overall satisfaction	87.5% reported high satisfaction
Willingness to continue	87.5% would continue using DailyCare
Interest in voice interaction	Very high; comments referred to Alexa/Google-style interaction

5.3 Cross-group Patterns

Three cross-group patterns emerged from the integration of questionnaire, diary, and interview data.

First, low-load interaction supported initial acceptance. Patients reported low anxiety, good message comprehension, and high enjoyment of reminders, while caregivers considered the application easy to understand and learn. These findings suggest that clarity, predictability, and reduced interaction demands were important conditions for initial engagement.

Second, acceptance and perceived usefulness were not identical. Patients showed high satisfaction and enjoyment, but perceived usefulness was heterogeneous. Caregivers rated daily planning highly, but task organization lower. This pattern indicates that DailyCare should not be interpreted simply as a productivity or task-management tool. Its perceived value also depends on whether reminders are experienced as understandable, timely, familiar, and emotionally acceptable.

Third, caregiver mediation shaped use and engagement. Caregivers selected tasks, adapted routines, configured reminders, and associated reinforcement elements. Their

role was therefore not limited to technical setup. They provided the contextual and relational knowledge that allowed reminders to become meaningful for the patient. This suggests that caregiver mediation was not only a condition of use, but part of the mechanism through which the system acquired value in practice.

6 Discussion

The community-based evaluation extends the previous exploratory study on DailyCare by examining the system with people with cognitive impairment and caregivers, most of whom were family members, in an everyday dementia-care context. The findings support three main insights.

1. **Initial acceptance depended strongly on low-load interaction, but ease of use did not fully determine perceived usefulness.**

   Patients reported low anxiety, good message comprehension, high enjoyment of reminders, and high overall satisfaction. Caregivers also reported low anxiety and positive ease-of-use ratings. These results suggest that a structured chatbot interaction, based on short prompts and predefined response options, can reduce barriers associated with cognitively demanding interfaces. However, the findings do not support a simple interpretation in which ease of use fully replaces usefulness. Patients could understand and enjoy the chatbot even when its functional usefulness was not perceived uniformly. This distinction is relevant in dementia care, where early acceptance may depend not only on instrumental utility but also on whether the interaction is clear, non-threatening, and easy to incorporate into daily routines.
2. **Caregiver mediation was not only a condition of use, but part of the mechanism through which the system acquired value.**

   Caregivers were not only responsible for technical setup. They selected tasks, adapted routines, chose reinforcement elements, and provided the contextual knowledge needed to make reminders relevant for each patient. This supports the view that assistive technologies for cognitive care should be designed for the caregiver–patient dyad rather than for the patient as an isolated user. In DailyCare, the caregiver defines what is worth reminding, how it should be framed, and which content may increase acceptance or motivation.
3. **Personalized reinforcement increased the relational and affective value of reminders.**

   Participants valued reminders more when they were not experienced as impersonal alerts. Congratulatory messages, familiar images, audio, and voice recordings helped frame the interaction as supportive and familiar. This suggests that the value of DailyCare lies not only in scheduling tasks, but in transforming caregiver-authored routines into short, accessible, and affectively acceptable prompts for the patient. In this sense, personalization is not only a usability feature; it is part of the care relationship mediated by the system.

These findings support the concept of mediated relational care introduced in this paper. DailyCare does not aim to replace the caregiver with an autonomous conversational agent. Rather, it provides a channel through which caregivers can make daily

routines more visible, understandable, and acceptable for the patient. Its contribution therefore lies in connecting caregiver configuration, accessible message delivery, and personalized reinforcement within the same dyadic workflow.

The results also point to the potential value of voice-based and multimodal interaction. Both patients and caregivers expressed interest in more natural interaction modalities, particularly voice. This is consistent with the need to reduce barriers related to reading, attention, and manual interaction. However, the findings also suggest that such extensions should be introduced carefully. Predictable prompts, clear confirmations, and simple fallback options would remain necessary in order to avoid increasing confusion or interaction errors.

Taken together, the study provides exploratory evidence that low-load interaction, caregiver-authored personalization, and relationally framed reinforcement are promising design directions for dementia-care reminder systems in community contexts.

7 Conclusions

This paper presented DailyCare, an accessible assistive technology designed to support people with cognitive impairment and their caregivers in everyday routines. Building on previous exploratory work with people with acquired brain injury and their caregivers, the paper reported a new exploratory evaluation in a community dementia-care context with people with cognitive impairment and caregivers, most of whom were family members.

The findings suggest that initial acceptance of DailyCare was supported by low-load interaction, clear messages, low technological anxiety, and caregiver involvement. Patients reported good comprehension of chatbot messages, high enjoyment of reminders, and high overall satisfaction, although perceived usefulness was more heterogeneous. This indicates that acceptance in dementia care should not be interpreted only in terms of functional utility. A system may be positively received when interaction is simple, familiar, and non-threatening, even if its practical usefulness varies across users and daily contexts.

A central contribution of this work is the characterization of DailyCare as a model of mediated relational care. Caregivers do not only schedule tasks; they select relevant routines, adapt reminders to the patient's context, and associate them with familiar messages, images, audio, or other reinforcement elements. The chatbot then delivers these caregiver-authored routines through short and accessible prompts. In this sense, DailyCare does not replace the caregiver with an autonomous conversational agent, but provides a channel for making everyday care routines more understandable, personal, and emotionally acceptable for the patient.

These findings have implications for the design of assistive technologies in cognitive care. Reminder systems should not be conceived only as functional schedulers. They should reduce cognitive load, support caregiver configuration, allow content personalization, and address not only task completion but also the patient's experience of the interaction. Designing for the caregiver–patient dyad is therefore essential when technologies are intended to support everyday dementia care.

Future work should examine longer-term use, broader and more diverse participant groups, and the further operationalization of constructs such as caregiver mediation and relational value. Technical extensions should also explore voice-based and multimodal interaction while preserving the predictability, clear confirmations, and low interaction demands required in cognitive care contexts.

Appendix A Instruments

A.1 Technology Acceptance Model (TAM)

Constructs covered: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Enjoyment (PE), Attitude toward Use (AU), Intention to Use (IU).

Table A1: Caregiver version (mobile/web app). Response scale: 1–7 Likert (1 = strongly disagree ... 7 = strongly agree).

Item	Question	Construct
UP1	Using DailyCare improves the person's self-esteem when completing daily tasks.	PU
UP2	DailyCare facilitates the organization and follow-up of daily tasks for me as a caregiver.	PU
UP3	DailyCare is useful to provide daily planning for the person with dementia.	PU
UP4	DailyCare helps increase the person's sense of achievement and dignity.	PU
FUP1	The DailyCare interface is easy to understand and use.	PEOU
FUP2	Learning to use DailyCare was simple for me.	PEOU
FUP3	DailyCare's navigation and functions are clear and accessible.	PEOU
DP1	Using DailyCare to plan and monitor tasks is rewarding.	PE
AU1	DailyCare makes daily management more interesting for me as a caregiver.	AU
IU1	I would like to continue using DailyCare in the future to support care.	IU

Table A2: Patient/chatbot version (Telegram "Pili"). Response scale: Yes / No / Sometimes.

Item	Question	Construct
UP1	Does Pili help you remember what you have to do during the day?	PU

Item	Question	Construct
UP2	Is it easy to understand the instructions that Pili gives you?	PEOU
UP3	Do you like receiving instructions from Pili to carry out your tasks?	PE
FUP1	Can you use Pili without help from other people?	PEOU
FUP2	Do you feel comfortable using Pili when you need to do a task?	PEOU
DP1	Is it pleasant when Pili reminds you and gives you instructions about your tasks?	PE
AU1	Do you think that if Pili talks to you, your day becomes more interesting?	AU
IU1	If you had a task tomorrow, would you like Pili to help you again?	IU

A.2 A.2 Adapted Technology Anxiety and Trust Questionnaire (TATT)

Dimensions covered in these adaptations include technological anxiety, confidence/-comfort, perceived need for assistance, and avoidance tendencies.

Table A3: Caregiver version (mobile/web app). Response scale: Never, Rarely, Sometimes, Frequently, Always.

Item	Question
A1	Do you feel nervous or tense when using DailyCare?
A2	Do you worry about making mistakes in DailyCare that could have negative consequences?
A3	Do you feel you need constant help from others when using DailyCare?
A4	Do you avoid using DailyCare when less technological options exist, even if they are less efficient?
A5	Do you feel uncomfortable talking about DailyCare with others due to low confidence in your ability to use it?
A6	Do you think you need to learn much more before feeling comfortable using DailyCare?

Table A4: Patient/chatbot version (Telegram "Pili"). Response scale: Never, Rarely, Sometimes, Frequently, Always.

Item	Question
A1	When the chatbot talks to you, do you feel confused?
A2	Do you worry about pressing something wrong when using the chatbot?
A3	Do you feel anxious if you have to use the chatbot alone without help?
A4	When the chatbot gives you instructions, do you feel pressured to do things quickly?
A5	Do you avoid using the chatbot because it makes you feel uncomfortable?
A6	Do you worry about not understanding what the chatbot is trying to tell you?

A.3 Final Satisfaction Questionnaire (patients and caregivers)

Table A5: Satisfaction questionnaire. Response scale: 1–5 Likert (1 = very dissatisfied / strongly disagree ... 5 = very satisfied / strongly agree), plus open-ended prompts.

Domain	Example item
Overall satisfaction	Overall, how satisfied are you with your experience using DailyCare?
Perceived support	I felt supported by DailyCare in the organization of daily tasks.
Willingness to continue	I would like to continue using DailyCare in the future.
Open comments	What worked well? What should be improved?

Declarations

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Competing interests. The authors declare that they have no competing interests.

Ethics approval and consent to participate. The study involving human participants was approved by the Research Ethics Committee of Universidad Carlos III de Madrid under the title "Sistema para la mejora de la autonomía de las personas con discapacidad cognitiva" [System for improving the autonomy of people with cognitive disabilities] (reference CEI23_09_MORENO_Lourdes). Written informed consent was obtained from all participants and/or their legal representatives, as applicable.

Consent for publication. Not applicable. The manuscript does not contain identifiable individual-level data, images, or personal information requiring consent for publication.

Data availability. The datasets generated and analysed during the current study are not publicly available because they contain sensitive information from people with cognitive impairment and family caregivers. Anonymized excerpts or aggregated data may be available from the corresponding author upon reasonable request and subject to ethical and data protection restrictions.

Code availability. DailyCare is a controlled research prototype and is not publicly available as a production service. Access to a demo instance may be provided upon reasonable request to the corresponding author, subject to institutional and data protection requirements.

Author contribution. LM contributed to the conceptualization, study design, system design, data analysis, and manuscript writing. PM contributed to system development, evaluation design, and manuscript revision. AD contributed to participant recruitment, data collection, and manuscript revision. All authors read and approved the final manuscript.

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