

Mediating Intergenerational Family Communication with Computer-Supported Domestic Technology

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Abstract. The proliferation of social media tools for facilitating interpersonal communication has inadvertently modified the ways in which intergenerational exchanges are supported. However, such technology has generally not acknowledged the complexity of designing social interaction mechanisms involving older adults, where the provided technology services and the actual needs of elderly people are not necessarily aligned. As a way to bridge this gap, we developed SocialConnector, a computer-supported domestic system that facilitates and mediates social interaction among older adults and other family members using their preferred interaction paradigms and communication media. This paper reports on the results of an empirical in-the-wild study evaluating the mediation effect of the proposed system with a sample of nine families over nine weeks. The study results show that older adults using SocialConnector were more engaged in interacting within their close social networks, whereas social awareness notification messages did encourage user participation between family members and their older adults. By addressing the lessons learned in this study, social computing designers and practitioners would be in a better position to identify plausible solutions that would improve user experience and the effectiveness of computer-supported mediation strategies in intergenerational communication settings.

Keywords: Older adults · Intergenerational interaction · Social media · Domestic technology · Empirical study · Computer-mediated communication

1 Introduction

In a world where global population is progressively getting older in both developed and developing economies, there is an increasing interest in deploying domestic supporting technology to encourage active aging in place and promoting sustainable informal elderly caregiving [21]. While family members provide more than 95% of the informal care for older adults who do not live in nursing homes [11], recent surveys show that most adults aged 65 and over express a desire to stay at home as long as possible when

aging [12]. Therefore, this paradigm is highly praised by governments, since it reduces the impact of older adults on public health services [14, 18].

In recent years, the study of intergenerational communication has gained the attention of socio-technical designers, researchers, and practitioners. Previous research shows that as a person gets older, the size of his/her social networks, sense of social connection, and interaction frequency all tend to decrease [3, 10], focusing more on close family members, mainly with their children and grandchildren [19]. This perceived degradation in social exchanges negatively impacts the physical and mental health of older adults, and therefore, their wellbeing. In that respect, one of the most important duties that informal elderly caregivers are expected to fulfill is ensuring that older adults sustain a suitable social health, i.e., favoring the social inclusion within the family network and avoiding potential negative effects of social isolation. Although face-to-face interaction and phone calls between older adults and their family members still prevail, the frequency, quality, and extension of these interactions seem to decrease [6].

The use of information and communication technology (ICT) is in part responsible of the digital divide that isolates the older adults. However, several researchers state that ICTs are also able to enhance and improve the social integration of the elderly (e.g. [1, 2, 4]). Such technologies can play in favor or against a certain target population depending on the ways in which they are designed and used.

To better understand the nuances of intervening in the home of older adults with domestic social technology, we deployed an interactive system named SocialConnector, which aims to monitor and mediate intergenerational family communication between older adults and the rest of their family networks. By analyzing the reports that are automatically generated by the system, we studied the usage of such a system aiming to derive implications for designing social computing systems in this domain.

This article contributes in advancing the field of computer-supported cooperative work in family settings by providing contextualized evidence on the design of computer-based technology to mediate family communication between older adults and their families, simultaneously respecting the preferences and main expectations of the involved parties.

The rest of this paper is structured as follows. Section 2 reviews related work. Section 3 introduces the SocialConnector system and describes its main services. Section 4 frames the empirical study design. Section 5 presents the study results, which are discussed in Sect. 6. Finally, Sect. 7 concludes and provides perspectives on future work.

2 Related Work

Considering older adults in the design of computing systems is complex, since multiple human and cultural factors must be addressed, which go beyond a mere characterization of their limitations caused by age or health conditions [15, 20, 23]. Indeed, older adults might be able to learn and overcome media literacy issues [8], thus effectively evading the negative effects derived from social isolation. We agree that the elderly can become active users of digital technologies. However, the design of these tools should be integrated into their particular sociocultural context, aiming to facilitate their acceptance

and appropriation. For instance, the use of common online spaces allows family members to share their values and attitudes, and strengthen the ties across generations [22].

Several authors have conceived domestic systems aimed to encourage the social integration of older adults. For instance, Garattini et al. [4] developed the Building Bridges system, a communication prototype installed in the homes of older adults as a way to enhance social interaction among both friends and strangers. According to the authors, the system facilitates the interaction among socially isolated older adults. The device consists of a 12-inch touch screen computer, embedded in a custom-made stand and incorporating a phone handset with cradle and speakers. Through the system, users can listen to regular broadcasts and, once they are finished, they can engage in group conversations with others. Besides, users can make direct calls to one or more people, write them short messages, and participate in a public chat room with other participants.

Cornejo et al. [2] developed Tlatoque, a situated display aimed to seamlessly integrate older adults into the social networking services used by their relatives. The system was evaluated in Mexico where some elderly family members live abroad. According to the authors, the device provides the means to ease the integration of older adults to their social networks, enhancing the asymmetric relations with their younger family members. The system is a lightweight Facebook client application running on an all-in-one PC with multi-touch screen capability. To start using the tool, a user acting as administrator sends an invite to the participating family members from a Facebook account created for the older adult. Using such information and the services provided by the Facebook API, the system retrieves the last ten uploaded photographs of the members in the social network of the elder. Over the time, complementary services aimed to provide ambient awareness to family members were considered, such as: comments on photos, context of the photo owner, weather, newspaper news, music, and Facebook likes.

Barbosa et al. [1] developed InTouch, an accessible software application running on Android-based tablets, targeted to older adults aged 80 and more under risk of social isolation and loneliness. The system was evaluated with five residents of a long-term care facility. The application has a non-language specific user interface based on icons, and it supports asynchronous communication. Given that accessibility concerns were extensively addressed during design, no typing is required for interacting with the system.

While the reviewed systems range from enhancing a sense of community among older adults, to facilitating intergenerational exchanges with family members, the novelty of our followed approach is that we explicitly involve the entire family network in the process. Furthermore, SocialConnector addresses cultural factors that enhance the perceived value and increase the technology appropriation of older adults interacting with such systems in collectivistic families. These design decisions, which are addressed differently with regard to the nature of cooperative work in informal elderly caregiving in other Western countries [7], provide an alternative view on how to design domestic technology to explicitly mediate intergenerational exchanges involving older adults.

3 SocialConnector

The SocialConnector system is a computer-supported intergenerational family communication mediator that uses cloud services to allow older adults to interact with their family networks using touch-based and voice commands [17]. The system mediates the communication between two parties, so that each participant could interact using their preferred media. The communication media currently supported are: synchronous and asynchronous voice messaging, synchronous video messaging, text messaging, and multimedia messaging. SocialConnector runs in a Tablet PC, physically installed in the older adult's house in one of two possible arrangements: fixed to a wall (Fig. 1a) or over a piece of furniture (Fig. 1b).

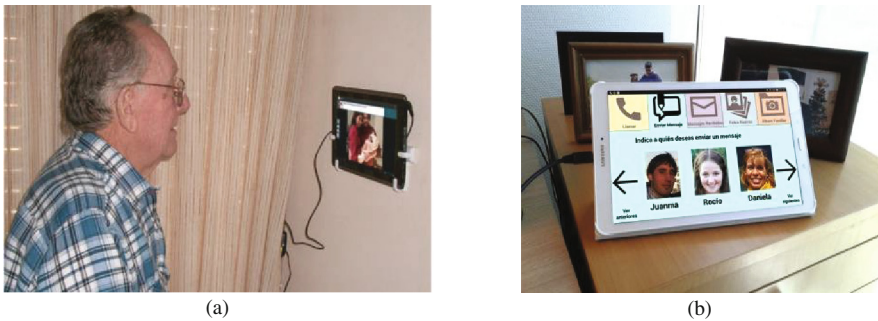


Fig. 1. Possible home arrangements of SocialConnector

Older adults interact with the system using their voice and selecting very simple options by touching the screen. The design of its user interface was initially informed by guidelines supported by the research community [13, 24], and later redefined with participatory iterative prototyping involving a sample of users in the target population. In terms of functionality, the application also monitors the interactions carried from and to older adults, and processes ambient data to infer details about the social health of older adults through embedded sensors in the Tablet PC, particularly the front camera.

3.1 System Description

This system was designed to facilitate the technology adoption and appropriation by older adults who are first-time computer users through seamless and simple user interfaces. The main interaction paradigm involves providing bidirectional synchronous and asynchronous communication services, exposing social media services to older adults without the burden of having to manage user accounts and passwords, and allowing family members to interact with their older adults using the communication media they prefer. Therefore, SocialConnector internally acts as a communication hub and as a mediator for enabling, facilitating, and rendering easier the social interaction process within a family network across multiple generations.

As a communication mediator, SocialConnector consumes and processes public social media data retrieved from the accounts of an older adult's family members, particularly email, Instagram photos, and Facebook posts. Then, it renders this content in an intuitive and accessible way for older adults, hiding behind a usable interface the inherent complexity of retrieving, processing, and transmitting social interaction data from the cloud [17]. Therefore, this system helps address the asymmetry of media preference among family members. Although currently SocialConnector supports Skype, email services, and Instagram, its modular design allows that interacting with any other service provider—such as WhatsApp, Telegram, or even new social media applications—could be possible in the future. The main restriction in accessing these services is that the owner provides access to them through regular Application Programming Interfaces (APIs), which are used for matching the dedicated connectors of SocialConnector with those provided by the third-party social media services.

3.2 Design Rationale

Acknowledging that intergenerational communication is asymmetrical [2, 6, 15], and the preferences of each party might not be negotiable, it turns evident that one major feature of any mediator has to be providing the means to family members to interact through their preferred means. Otherwise, the communication process may not be effectively completed, thus negatively impacting older adults by discouraging socialization [17].

The design of SocialConnector followed an iterative user-centered approach [9], involving multiple cycles of design, prototyping, evaluation, and refinement of the proposed services. Following an empirical approach, we worked directly with different samples of older adults who interacted with the system and tested it through successive stages of prototyping, until reaching a mature and robust product that could be evaluated in a real-life scenario. In particular, we followed the recommendations suggested by Barbosa Neves et al. [1] on design considerations for facilitating the adoption of communication technology by older adults.

3.3 Mediating Intergenerational Family Communication

The interaction services provided by SocialConnector have been conceived and iteratively refined based on the definition of intergenerational communication and caregiving roles, as well as the attitudes, expectations, viewpoints, and concerns of family members regarding computer-supported communication mediators, as defined by Gutierrez and Ochoa [7]. Therefore, the current version of the system implements five communication channels (upper menu in Fig. 2), through which older adults can interact with their family members using regular social media services. Next we briefly explain each channel.

- **Video calls.** This service provides access to audio/video calls mediated through Skype. Once the older adult selects this option in the menu, SocialConnector displays a list of contacts presented as an interactive carousel, where the names and profile pictures of his/her family members are displayed. The user just needs to select the target contact for initiating the call, without having to require a username or password. In fact,

SocialConnector internally manages the user authentication process using the credentials stored in the system. Then, it gives the session token to Skype for making the call. Once both parties end up the videoconference session, the system regains the session token and the user interface is redirected to home, leaving the user at the same starting point, ready for a new interaction.

- **Outgoing messages.** The older adult using SocialConnector can send a message to a family member of his/her choice through email. In order to simplify the process of composing a new message, the older adult uses a speech-to-text service in which he/she dictates the message he desires to send to his family member, and SocialConnector internally manages the user authentication and sends the email.
- **Incoming messages.** Through this service, the system displays the ten most recent messages received in the social media accounts of the older adult. In particular, this component translates the message structure from the original source, and uniformizes it in a format that can be understood by the older adult interacting with the system. In order to prevent misuse and spamming from external sources, this service filters the incoming messages to those belonging to the list of contacts—family members—that was defined during setup.
- **Incoming photos.** Similar to the previous service, in this module SocialConnector organizes the incoming photos and other multimedia content, rendering it in an accessible and uniform way to older adult. Although this service was originally conceived as an output channel of content, i.e., not providing the means for a direct interaction between the family member publishing the contact and the older adult, through conducting pilot field studies of SocialConnector we realized that this service could be used as a mechanism to trigger interactions between the involved parties.
- **Photo album.** This is a collection of the most recent media content sent to the older adult by his/her contacts. The photos displayed in this album are organized as an interactive carousel where the older adult can navigate through them. During the last stages of prototyping with end users, we learned that older adults found a hidden value in this service by augment the stored photos with short messages, hence acting as a sort of shared memory between the older adult and his/her contacts.

In addition to the presented services, SocialConnector manages notification mechanisms. On the one hand, they serve to alert the older adult of new content within the system (i.e., notification badges, as shown in Fig. 2). On the other hand, they can act as social awareness triggers to alert family members, such as in the case of new content created by the older adult, or as reminders for engaging them in social interaction. Finally, given that SocialConnector runs on a Tablet PC, it uses the embedded sensors in the hardware to assist in monitoring the activities of the older adult in a non-invasive way.



Fig. 2. Interaction services provided to older adults (main user interface)

4 Study Design

Through an empirical in-the-wild study, we evaluated the effect of introducing the SocialConnector system at the home of a sample of older adults, and mediating their interaction with their family network using social awareness mechanisms (i.e., reminders and notifications). In particular, we gathered quantitative data regarding system usage by older adults through automatically generated system usage logfiles, which were then aggregated for conducting the data analysis.

4.1 Participants

Through online notices, email lists, and convenience and snowball sampling, we recruited nine middle-class adults acting as informal caregivers for their parents. Following the characterization on intergenerational communication and elderly caregiving family roles proposed by Gutierrez and Ochoa [7], these participants assumed at the time of the study either the role of *assistant* or *monitor* within their families.

We centered our sampling strategy on these recruited caregivers, extending then to their wider family network. In particular, we approached the informal caregivers' parents (who were the main targets of the proposed intervention) as well as their siblings, children, and nephews. In all cases, participants had to be over the age of 14 and explicitly express their intention of being part of the study. Furthermore, we restricted the study sample to cover at least one older adult, one assistant, one monitor, one helper, and one outsider in each participating family. Table 1 summarizes the structure of the participant family networks. In each family network, gender and age of each participant are provided.

Table 1. Structure of participating family networks

Family	Older adults	Assistants	Monitors	Helpers	Outsiders
1	1M (81)	1F (71)	0F	1F (36)	3F (21, 17, 14)
		0M	2M (48, 39)	1M (19)	0M
2	1M (78)	1F (54)	1F (49)	1F (23)	0F
		0M	0M	1M (51)	2M (18, 21)
3	1F (69)	0F	1F (33)	2F (39, 37)	0F
		1M (31)	1M (38)	0M	1M (16)
4	1F (73)	1F (44)	1F (37)	0M	1F (19)
		1M (41)	0M	1M (25)	0M
5	1F (75)	0F	0F	2F (48, 41)	0F
		1M (42)	2M (49, 25)	0M	2M (25, 23)
6	1M (72)	1F (39)	1F (44)	0F	2F (21, 19)
		0M	1M (42)	1M (41)	0M
7	1F (79)	1F (34)	1F (38)	0F	0F
		1M (29)	0M	1M (31)	1M (29)
8	1M (71)	1F (68)	1F (66)	0F	1F (38)
		1M (69)	0M	1M (34)	0M
9	1F (80)	1F (59)	1F (36)	1F (39)	1F (16)
		1M (30)	1M (37)	0M	1M (15)

The final study sample was composed of 64 people across 9 family networks ($n = 9$, 7, 7, 6, 8, 7, 6, 6, 8, respectively in each family). All families were based in Santiago, Chile, and were spread across several households within the urban area of the city.

4.2 Materials

Each older adult participating in the study was provided with a tablet PC equipped with the latest version of the prototype system. The evaluated version of SocialConnector runs on a 9.6-inches Samsung Galaxy Tab E tablet under Android 4.4 as operative system.

In order to control the effect of Internet bandwidth in the perceived user experience, we equipped each tablet with a SIM card providing mobile access to Internet over 3G. Participants in each family interact with the older adult using their own terminals over Skype (for instant messaging) and email (for direct messages and photo albums).

4.3 Procedure

We structured the study design in three stages, spanning over a time period of nine weeks.

- **Setup.** We recruited a sample of informal family caregivers, who acted as seeds for recruiting the family networks participating in the study and will assume the role of coordinator during the study. Being a family coordinator involves setting up the device by collecting and managing the social network data of family members within

the system, and assisting the older adult on using the system in case of need. After conducting a short interview with the candidate caregivers, we screened their family networks against the stated sample requirements. Once defined and confirmed the participant family networks, we asked all members for their explicit, free, and informed consent to participate in the study. Finally, we organized an informal meeting at the home of the participating older adult with the assistance of the coordinator, where we installed the system at a location chosen by the older adult, performed a demonstration on its usage, and asked the informal caregiver acting as coordinator to setup the initial data of the involved family members. All participants were aware that the system would track their interactions with the older adult and were left with information sheets on the proposed services and contact information of both the caregiver acting as coordinator and the research team.

- **System usage.** A daily log of the system usage by the older adult was automatically generated and reviewed by the research team every day. In such a log, we kept the following data: (1) incoming Skype calls, (2) outgoing Skype calls, (3) incoming email messages, (4) outgoing messages, and (5) incoming photos. The system usage was tracked for a period of nine weeks. During the first three (i.e., *pre-intervention*), we did not integrate any method for mediating the interaction with other family members. During the following three weeks (i.e., *intervention*), we introduced a social awareness mechanism informing the family members on the effect of their interaction with the older adult (e.g., we send an informal message once the older adult has read an email sent by them), and we explicitly send periodic messages to family members to invite them to interact with the older adult. In order to contrast the effect of this intervention with the baseline measure obtained on the setup stage of the study and on the pre-intervention stage of system usage (i.e., *post-intervention*), we removed these awareness mechanisms during the last three weeks of the trial.
- **Closure.** After the nine weeks of the deployment, we organized a second informal meeting with each family at the home of the older adult. In these meetings, the first author moderated in each family a focus group contrasting the viewpoints of all participants regarding their perceptions on system usefulness, family connection, privacy issues, motivation, reasons to use/not use the system, and articulation with the informal elderly caregiving process. By the end of the family meeting, we removed the device from the home of the older adult.

4.4 Data Collection and Analysis

By studying the generated log files reporting the interaction activity with the Social-Connector system, we aim to study whether the system encourages a sustainable increase in the frequency of social interaction exchanges from/to the family older adults. This can be formulated in the following two work hypotheses:

- (H1) The social awareness mediation increases the frequency of exchanges with older adults; and

- (H2) After removing the mediation prompts, such frequency of exchanges does not decrease.

We studied the main effect of the intervention following a one-way repeated measures ANOVA. In those cases where the collected data violated the assumption of sphericity, we corrected accordingly the degrees of freedom for the effect following the Greenhouse-Geisser procedure. In order to study both contrasts, we performed post-hoc tests whenever the main effect was deemed significant. In such a case, we adjusted accordingly the significance level following the Bonferroni correction for multiple comparisons.

All statistical analyses were conducted using SPSS 21. The calculation of Cohen’s *d* effect size value was performed following the method proposed by Morris and DeShon [16] for within-subjects studies. We considered $\alpha = 0.05$ as significance cut-off.

5 Results

In order to study the effect of mediating the interaction within the family network through contextualized social triggers, we ran a one-way repeated measures ANOVA to compare the volume of incoming calls, messages, and photos in three times: pre-intervention (weeks 1 to 3), during the intervention (weeks 4 to 6), and post-intervention (weeks 7 to 9). Figure 3 shows the volume of incoming interaction along the study.

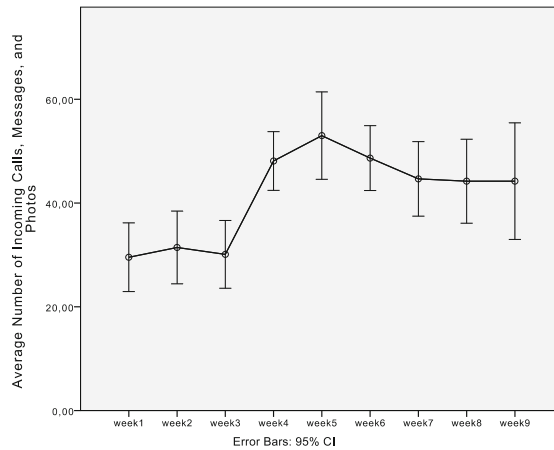


Fig. 3. Volume of incoming interaction through SocialConnector

Mauchly’s test indicated that the assumption of sphericity had not been violated, $\chi^2(2) = 0.031, p = 0.985$; therefore, degrees of freedom were not corrected. The results show that there was a significant effect of mediating the interaction with social awareness notifications: $F(2, 16) = 28.83, p < 0.001, \text{partial } \eta^2 = 0.783$.

Three paired-samples t-tests were used to make post hoc comparisons between conditions with p-values and significance levels adjusted following the Bonferroni

correction. A first paired-samples t-test indicated that there was a significant difference in the scores for pre-intervention ($M = 91.1$, $SD = 19.1$) and intervention ($M = 149.8$, $SD = 25.3$) conditions; $t(8) = -7.223$, $p < 0.001$, $95\%CI = [-83.182, -34.172]$, $d = -2.466$. A second paired-samples t-test indicated that there was a significant difference in the scores for pre-intervention ($M = 91.1$, $SD = 19.1$) and post-intervention ($M = 133.1$, $SD = 31.1$) conditions; $t(8) = -5.458$, $p = 0.002$, $95\%CI = [-65.208, -18.792]$, $d = -2.063$. Finally, running a third paired-samples t-test indicated that there was not a significant difference in the scores for intervention ($M = 149.8$, $SD = 25.3$) and post-intervention ($M = 133.1$, $SD = 31.1$) conditions; $t(8) = 2.067$, $p = 0.218$, $95\%CI = [-7.647, 40.981]$, $d = 0.705$.

These results suggest that *mediating the interaction of family members with notification triggers does have an effect on the volume of calls, messages, and photos sent to the older adults participating in the study*. More specifically, our results suggest that during and after sending contextualized social awareness reminders to family members, they tend to increase their volume of interactions with their older adult. However, further research needs to be conducted in order to verify if the effect of intervening the social interaction space of the involved family members lasts longer than the observed period in the study.

Similarly, aiming to understand how older adults interacted with the system as a way to communicate with their fellow family members throughout the observed period, we ran a one-way repeated measures ANOVA to compare the volume of outgoing calls and messages following the three stages in which the experiment was divided: pre-intervention (weeks 1 to 3), during the intervention (weeks 4 to 6), and post-intervention (weeks 7 to 9). Figure 4 shows the volume of outgoing interaction—originated from older adults and mediated through the system—throughout the study.

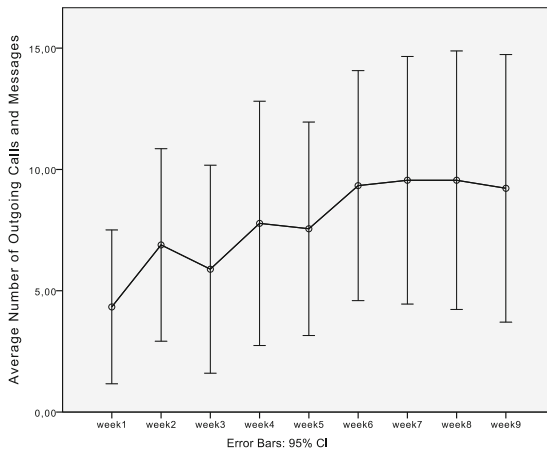


Fig. 4. Volume of outgoing interaction through SocialConnector

Mauchly's test indicated that the assumption of sphericity was violated, $\chi^2(2) = 6.152$, $p = 0.046$; therefore, degrees of freedom were corrected using

Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.631$). The results show that there was a significant effect of time on the volume of outgoing interactions generated from the older adults participating in the study: $F(1.26, 10.09) = 6.367$, $p = 0.025$, partial $\eta^2 = 0.443$.

Three paired-samples t-tests were used to make post hoc comparisons between conditions: pre-intervention ($M = 17.1$, $SD = 13.5$), intervention ($M = 24.7$, $SD = 16.4$), and post-intervention ($M = 28.3$, $SD = 19.9$). None of the pairwise comparisons were seen as significant, when adjusting the p-values and significance levels with the Bonferroni correction: pre-intervention vs. intervention: $t(8) = -2.630$, $p = 0.091$, $95\%CI = [-16.219, 1.108]$, $d = -0.928$; pre vs. post: $t(8) = -2.654$, $p = 0.087$, $95\%CI = [-23.975, 1.531]$, $d = -1.007$; and intervention vs. post: $t(8) = -1.687$, $p = 0.390$, $95\%CI = [-10.220, 2.887]$, $d = -0.666$.

These results suggest that *there is a slight tendency in time to increase the frequency of outgoing interactions, although not statistically significant between experimental conditions*. Therefore, we cannot generalize that this situation will be sustained in time. We hypothesize that this tendency can be attributed to either: (1) a learning effect and/or (2) a positive moderation on the frequency of outgoing interaction due to the increasing volume of interaction produced by family members (i.e., given that family members contact the older adult more frequently, s/he will contact them back more frequently).

6 Discussion

The aggregated results for the variables measured through SocialConnector (i.e., incoming calls, messages, and photos, and outgoing calls and messages) show that there was a significant main effect on the interaction mediated by the system before and after the introduction of social awareness messages; this supports H1. Furthermore, this effect was not affected after the messages were removed from the system (H2), although we can only argue for the validity of this effect on the studied period.

Following the study results, notification messages are an effective way to mediate the social interaction between family members and older adults. However, this effect has not been necessarily reciprocated by older adults, who did not show increasing levels on their participation as a result of this mediation. Nevertheless, they did show increasing values on their engagement with the SocialConnector system, either by a learning effect or by an indirect positive feedback on their activity production (i.e., outgoing calls and messages) due to an increasing number of incoming calls, messages, and photos.

Similarly, this observation was also suggested by the results of outgoing interaction; however, we cannot attribute the mediation of social awareness messages as a cause to the slight increase on older adults' mediated calls and photos through SocialConnector, given that post hoc test results were not statistically significant. In that respect, we hypothesize that this variation could be due either to a learning effect or to an indirect feedback on the behavior of older adults triggered by a positive increase on incoming calls, messages, and photos sent by other members in the family network. In any case, replicating this study with a larger sample of older adults could possibly increase the

statistical power of tests, and therefore provide more ground for validating or not the stated hypotheses.

6.1 Implications to Design

As broader design concepts, we identified in the exit focus groups that the design of computer-supported intergenerational communication mediators needs to account for the opposed views on ageism and technology design. These views particularly contrast the perceived independence assumed by older adults and the views on decline and technology reluctance raised by their family members. In particular, that of the family members who are more closely involved in assuming caregiving tasks.

While prior literature acknowledges the existence of a vicious circle on technology adoption, particularly that expressed by older adults in collectivistic families [Guti16], the study results go a step further in this line of research. In particular, the study results imply that socio-domestic computing systems aiming to mediate intergenerational family communication need to account for the diversity of views and involvement of different stakeholders within the family network.

The perceived effects of mediating the social interaction space with SocialConnector are also in line with the claims of Grönvall and Verdezoto [5], which state that supporting systems should move away from passive monitoring and surveillance, to solutions that assess and assist the individual enforcing active information seeking. In that respect, the design of SocialConnector as a mediator, while uses as input monitoring data retrieved from ambient sensors, the main intervention in the social interaction space is pushed toward family members in the supporting network. Therefore, design considerations, such as personalization and adaptation in persuasive and social awareness triggers, will be addressed in future research.

6.2 Study Limitations

While valuable, the reported results are only applicable to the studied participants as the sample size is not big enough for yielding high statistical power, which would warrant generalization for a broader population. Regarding the qualitative analysis grounded on the mediation effect of SocialConnector in the studied nine families, the implications of the study findings are applicable only to the particular socio-cultural scenario.

7 Conclusions and Future Work

In this paper we presented the main findings of a mixed-methods in-home study, understanding the mediation effect of SocialConnector in a sample of intergenerational families. On the one hand, we measured how older adults and their family members interacted through the system. On the other hand, we explored the implications of the mediation of SocialConnector across the studied family networks through a focus group session with each family at the end of the trial.

The obtained results suggest that older adults using SocialConnector did show increased social engagement, particularly with family members, when exposed to interacting with the system over a period of nine weeks. In particular, regarding the mediation with family members in the surrounding network, social awareness notification messages to encourage user participation are an effective way to mediate the social interaction space of the involved parties. Although subtle, the study results also show there was an increase in the produced outgoing interaction of older adults with their family members, which can be attributed either to a learning effect or an indirect positive feedback due to an increased volume of incoming messages, calls, and photos.

In terms of design, we inferred implications that can be used to inform the development of further software applications or functionality to better impact the social interaction space of family members. In particular, the study results suggest that older adults liked interacting with SocialConnector, as it offered them an alternative way for engaging in social interaction with fellow family members. However, participating older adults also reflected on a major concern involving privacy matters and information disclosure across the family network. The reason behind this concern can be attributed to an intention to not worry or burden the family members caring for them, and because there is still a reticence on trusting an external agent—such as SocialConnector—for mediating intergenerational communication about personal matters.

As future work we will explore the relationship between system usage and discriminant factors, such as: gender, prior experience of older adults using computer-based technology, whether they share or not their household, and their social engagement. Similarly, we plan to extend our qualitative analysis on system usage and perceived value, by conducting individual semi-structured interviews with the participating family members in this study.

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