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# Communication technologies in older people's long-distance family relationships, and the impact on isolation and loneliness

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## ABSTRACT

The concept 'performance expectancy' is used to theorize about older people's day-to-day use of technology mediated communication (telephone, text/emails and video calls) in family relationships and the impact on social isolation and loneliness. Using theoretical and methodological triangulation six mediation models are conceptualized, followed by empirical validation using a nationally representative dataset of older people ( $\geq 65$  years) living in Wales, UK ( $N=2,099$ ). The results reveal that frequency of telephone and video calls mediate the relationship between proximity of family and social isolation, and telephone calls mediate the relationship with loneliness. Text/emails have no significant mediating effect. Qualitative data analysis provides a deeper understanding of conditions that facilitate technology mediated communication. Demonstrating the impact of lifecourse habits, social context and environment on technology mediated communication shifts the focus from individual deficits to other reasons for non-adoption. Understanding the link between the individual, the social-cultural and social structural environment, social interaction, and loneliness requires an understanding of what is important to older people. For example, knowledge concerning the role of embodied presence in alleviating loneliness can be used to better understand the likelihood of implementing successful interventions.

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## KEYWORDS

older people; technology mediated communication; telephone; social relationships; families; CFAS Wales study

## Introduction

Peine and Neven (2019) argued that the disciplinary divide between science and technology studies (STS) and gerontology has prevented academics from properly addressing the relationship *between* technology and society. However, several decades of research underpins the Social Construction of Technology (SCOT) theory (Pinch & Bijker, 1984). SCOT theory posits that technological development is the outcome of social

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processes. Accordingly, the social construction of ageing influences assumptions of key actors in the development process (e.g., engineers and scientists). Assumptions concerning the role of technology in older people's lives are especially influential (Burema, 2022).

In general, science and technology studies (STS) have favored a 'deficit' model of ageing in which older people are often portrayed using negative stereotypes, for example, as living with disabilities, in poor health, isolated and lonely (Burema, 2022). This model lends itself to 'interventionist logic' where ICT is used to solve challenges associated with ageing (Peine & Neven, 2019), such as, compensating for poor dexterity, mobility, or cognitive function (e.g., Kernebeck et al., 2019; Thorpe et al., 2016). This approach draws on the medical model of ageing and is frequently contested within critical gerontology.

Critical gerontology is concerned with power in relation to the construction of older age (Burholt & Scharf, 2021). From the critical perspective, the medical model of ageing contributes to, and reinforces ageism. Representing 'old age' as a time of dependence elicits perceptions that the older population is a burden and contributes to the marginalization of older people. To provide a counter-narrative to the medical model and interventionist approach we examine and theorize about the use of technology mediated communication (TMC) in the everyday lives of older people living in Wales (UK) in relation to social isolation and loneliness.

TMC refers to methods of interpersonal communication that is controlled and facilitated by technology tools and applications. TMC includes old (phone) and newer (text, email, video-calls) forms of technology. Whilst TMC is subsumed in the broader concept of information and communications technology (ICT) we make the distinction between using technologies for information and services as discrete from communicating with others. Social isolation is defined as a lack of, or low levels of meaningful social contact through social relationships (Lubben et al., 2006). Social isolation is not always a negative outcome as it may meet the preferences of a person to be alone. Loneliness is defined as a negative emotional experience that is the reaction to a mismatch between expectations of the quality and quantity of social relationships and those that are achieved (Prohaska et al., 2020). People may be isolated but not lonely, lonely but not isolated, isolated and lonely, or neither lonely nor isolated.

Interventions to fight loneliness or social isolation of older people are becoming more technologically focused. A recent scoping review of communication technologies observed that only 55% of 61 studies demonstrated a significant effect on loneliness, and only 44% of 41 studies had an effect on social isolation of older people (Döring et al., 2022). The authors concluded that more theoretical work was required to understand the relationship between communication technologies, social isolation and loneliness. In this article, we use theoretical triangulation. First, we theorize about the use of technology mediated communication (TMC) in relation to social isolation and loneliness from a critical gerontological perspective referring to the dynamic interrelationships among individual, social, and environmental and societal factors across the life course. Second, we utilize some concepts that have been used to explain the rate of adoption and (non)use of ICT in unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2012).

Emanating from a critical review of extant literature, UTAUT integrates key constructs from technology acceptance theories from information systems management,

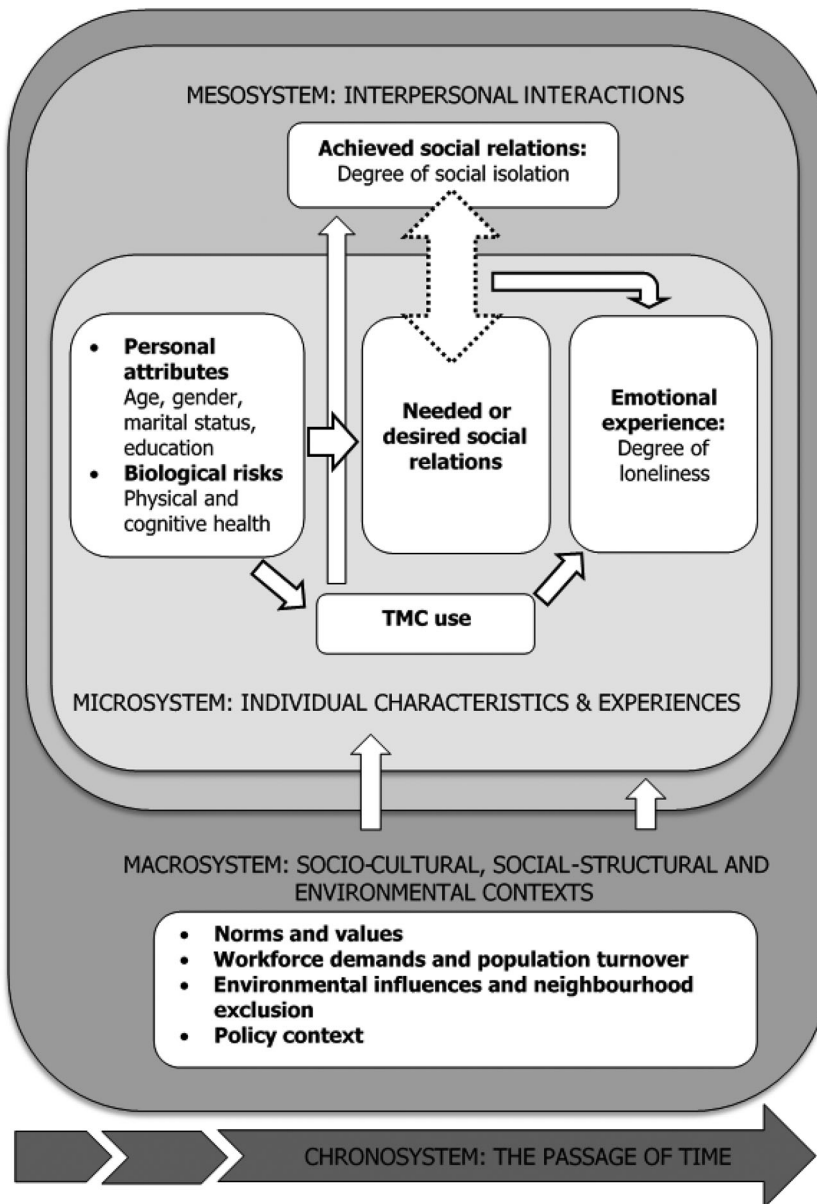
social and behavioral psychology (Venkatesh et al., 2003). The theory was originally developed to examine adoption of technology within organizations. Motivation for using technology is based on ‘performance expectancy’, that is, the user’s perception concerning the extent to which the technology would improve the workplace experience. This is broadly equivalent to ‘perceived usefulness’ described in earlier Technology Acceptance Models (TAM) and in the Senior Technology Acceptance Models (STAM) (Chen & Chan, 2014; Renaud & Biljon, 2008). UTAUT has been applied to consumer groups. It has been used to examine older peoples’ adoption social media (Bixter et al., 2019) where performance expectancy has been operationalized as the perceived potential contribution to social connectedness.

Traditionally TAM, STAM and UTAUT concepts have been operationalized as a discrete set of variables that are used in quantitative modeling in which older people are frequently described as passive and reluctant adopters of technology (Peine & Neven, 2019). The systematic reproduction of negative social representations of older people is a form of unconscious bias within STS that reinforces the idea that older people are not interested in TMC. Ignoring the habits, interests and issues confronting older people in the use (and perceived usefulness) of ICT (Lai, 2020) can lead to practices that deprioritize, or exclude older people as potential uses of TMC (Rosales & Fernández-Ardèvol, 2020). By adopting a critical lens, we explore the synergy between the experiences and behaviors of older people, the meaning of UTAUT concepts, and the contexts in which TMC is used.

In this article, we draw on the concept of ‘performance expectancy’ to theorize about older people’s motivations to use TMC in every day live. We suggest that the extent to which a technology is perceived to provide beneficial social outcomes will drive use. Drawing on quantitative data, we start from the premise that social-structural changes in working practices and the mobility of the labor force have resulted in geographically dispersed families. Today older people may have fewer proximal kin compared to previous cohorts (Burholt & Sardani, 2018). Consequently, we anticipate that older people will be motivated to use TMC to connect to family members living at a distance to avoid negative outcomes such as social isolation and loneliness (Figure 1). Thus, we posit that TMC is adopted by older people to compensate for decreased face-to-face contact with relatives living at a distance (Bixter et al., 2019).

We hypothesize that living  $\geq 50$  miles from the nearest relative will be associated with greater use of three types of TMC (telephone (H1a), text and email (H1b), and video-calls (H1c)). We postulate that TMC is regarded by older people as a solution to bridge the physical and emotional distance between kin, with the potential to stave off social isolation and loneliness (e.g., Cutler, 2015). Consequently, we predict that living  $\geq 50$  miles from the nearest relative will be associated with more social isolation (H2a) and that the association between distance from a relative and social isolation will be mediated by TMC through phone contact (H2b), text/email (H2c) and video calls (H2d). Furthermore, we predict that living  $\geq 50$  miles from the nearest relative will be associated with more loneliness (H3a) and that the association between distance from a relative and loneliness will be mediated by TMC through phone contact (H3b), text/email (H3c) and video calls (H3d) (Figure 2).

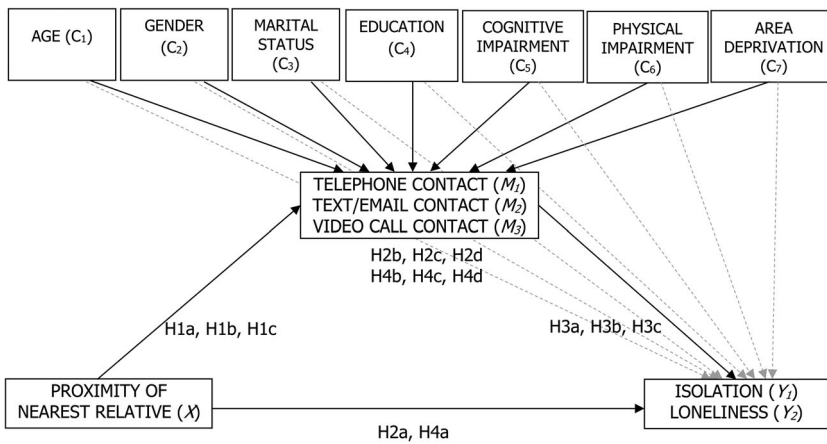
In our theorized model, an individual’s access to personal resources (i.e., a spouse), competencies (i.e., level of education), and characteristics (i.e., gender and age), physical and cognitive health may influence the use of TMC (Friemel, 2016). Furthermore,



**Figure 1.** A gerontological model of technology mediated communication, isolation and loneliness.

disadvantaged places (macrosystem) may have fewer facilities and services that negatively influence the use of TMC (Burholt & Scharf, 2014). These are referred to as mediating factors and facilitating conditions in UTAUT models, but have also been shown to increase the risk of isolation and loneliness (Burholt & Scharf, 2014). We examine the magnitude of the relationship of each covariate on TMC use, while simultaneously controlling for influences on isolation and loneliness.

In addition to using theoretical triangulation, we use methodological triangulation. We combine quantitative with qualitative data and analyses to add sophisticated rigor (Flick,



**Figure 2.** Hypothesized models: Mediators  $M_1$ – $M_3$  and dependent variables  $Y_1$  and  $Y_2$  entered in separate simple mediation model.

2018), and a deeper understanding of older people’s use of TMC. Using a nationally representative dataset of older people living in Wales UK, we use a sequential-explanatory strategy to test the validity of the statistical models through the convergence of qualitative data. We use qualitative data in (i) a deductive thematic analysis of participants’ semi-structured interview transcripts to identify spontaneous and unprompted references that could be considered synonymous with several UTAUT concepts (effort expectancy – perceived ease of use; social influence – perceived expectations of peers; facilitating conditions; price value – trade-off between cost and benefit; and habit) and their role in older people’s use and acceptance of TMC (Venkatesh et al., 2012), and (ii) an inductive thematic analysis to identify additional themes relating to the use of TMC.

## Method

### Data source

Quantitative and qualitative data are drawn from the Cognitive Function and Ageing Study (CFAS Wales), a nationally representative study of community-dwelling people aged 65 and over in Wales, United Kingdom (UK). Ethical approval was granted by the North Wales Research Ethics Committee (West), reference number 10/WNo01/37. Participants for the Wave 1 survey (2012–2014) were randomly sampled from primary care registration lists in three Local Authorities in Wales (Neath Port Talbot, Gwynedd, and Anglesey) and stratified according to age group (65–74 years: ≥ 75 years). 3,593 computer-assisted personal interviews were conducted in English or Welsh in participants’ homes. The Wave 2 survey was conducted with 2,236 participants (62.2% of the Wave 1 sample) (2014–2016). The quantitative analysis in this article is based on a sample of 2,099 participants from Wave 2 with no missing data on the variables used in the analyses (Table 1).

At Wave 1 a qualitative sample was purposively selected from survey participants to achieve a sample of 133 older people based on population distribution of network

**Table 1.** Descriptive Statistics for the Sample ( $N = 2,099$ ).

	All
Age, mean (SD) years	75.99 (6.54)
Male %	49
Married %	63
Education, mean (SD) years	11.87 (2.76)
Area Disadvantage, median (SD) quintile	3 (1.24)
Proximity of relative, median (SD)	2 (1.57)
Social isolation, mean (SD)	15.42 (5.16)
Loneliness, mean (SD)	0.95 (1.17)

types The Wave 2 qualitative sample ( $N = 26$ ) comprised all participants that had different networks in Waves 1 and 2, and a random selection of participants with stable networks across both waves. All interviews in Wave 1 and 2 used a structured topic guide and were conducted in English or Welsh in participants' homes. In Wave 1 and 2, using a hierarchical mapping technique (Antonucci, 1986), participants were asked about the frequency and type of contact (face-to-face, phone, text, email, and video calls) that they had with each network member. In Wave 2, participants were asked about the use of technology in relation to maintaining relationships with family. Additionally, a purposive sample of 10 participants from an interim pre-release Wave 1 dataset ( $N = 2,038$ ) were drawn for a loneliness sub-study. Participants who identified as sometimes or always lonely (in the survey) were eligible for inclusion, and five were randomly selected from each study area (i.e., five each from North and South Wales). Narrative interviews took place in participant's homes using a topic guide as an aide memoire to explore transitions in loneliness.

### **Dependent variables**

Social isolation ( $Y_1$ ) was measured using the 6-item Lubben Social Network Scale (LSNS-6). The questions evaluate the frequency of contact and quality of kin and non-kin relationships. Score ranges from 0 (high isolation/few social resources) to 30 (low isolation/many social resources) (Lubben et al., 2006). Loneliness ( $Y_2$ ) was measured using the six-item De Jong Gierveld scale. The score is the sum of all items, where higher scores represent greater loneliness (De Jong Gierveld & Van Tilburg, 2006).

### **Independent variable**

Proximity of nearest relative (not spouse) ( $X$ ) was ascertained by asking participants 'How far away, in distance, does your nearest child or other relative live?' Responses categories represent  $\leq 50$  miles (0) and 50+ miles (1).

### **Mediating variables**

Frequency of phone contact ( $M_1$ ) was ascertained by asking participants 'How often do you speak to your children or other relatives over the phone?' Similar questions ascertained frequency of text or email contact ( $M_2$ ) and video call contact ( $M_3$ ). Ordinal responses categories were daily (1), 2–3 times a week (2), at least weekly (3), at least monthly (4), and less often (5).

## **Covariates**

Demographic covariates ( $C_1$ – $C_7$ ) were age (years) ( $C_1$ ), gender coded as male (1) or female (0) ( $C_2$ ), married (1) or not (0) ( $C_3$ ), and full time education (years) ( $C_4$ ). Cognitive impairment was assessed by the Mini Mental State Examination (MMSE) (Folstein et al., 2001): scores ranged from severe impairment (0) to no significant impairment (30) ( $C_5$ ). The modified Townsend disability score was used to assess functional ability: scores ranged from no functional incapacity (0) to very severe functional incapacity (18) (McGee et al., 1998) ( $C_6$ ). Area deprivation was operationalized using quintiles of the aggregated Welsh Index of Multiple Deprivation (WIMD) 2014 (Welsh Government, 2015) coded from most deprived (1) to least deprived (5) ( $C_7$ ).

## **Analytical procedure**

PROCESS (version 3.4) for SPSS (version 26) was used to implement simple mediation analysis to test hypothesized pathways (Hayes, 2018). In six simple mediation models, we tested whether frequency of phone contact ( $M_1$ ), text/email contact ( $M_2$ ) and video call contact ( $M_3$ ) mediated the effects of living more than 50 miles from the nearest relative (X) on social isolation ( $Y_1$ ) and loneliness ( $Y_2$ ) after controlling for age, gender, marital status, education, alongside cognitive and functional impairment and area deprivation (Model 4 (Hayes, 2018)). Bootstrapped (5000 random resamples) estimates of 95% confidence intervals (CI) were used to determine significant mediation.

Five researchers undertook a thematic content analysis of interview transcripts using NVivo (version 12 Pro). Cohen's kappa demonstrated that inter-coder reliability for five superordinate nodes was high (>.60). In the loneliness sub-study a PhD candidate coded the data. Detailed information on analysis and coding structure is available in Supplemental Online Material.

## **Results**

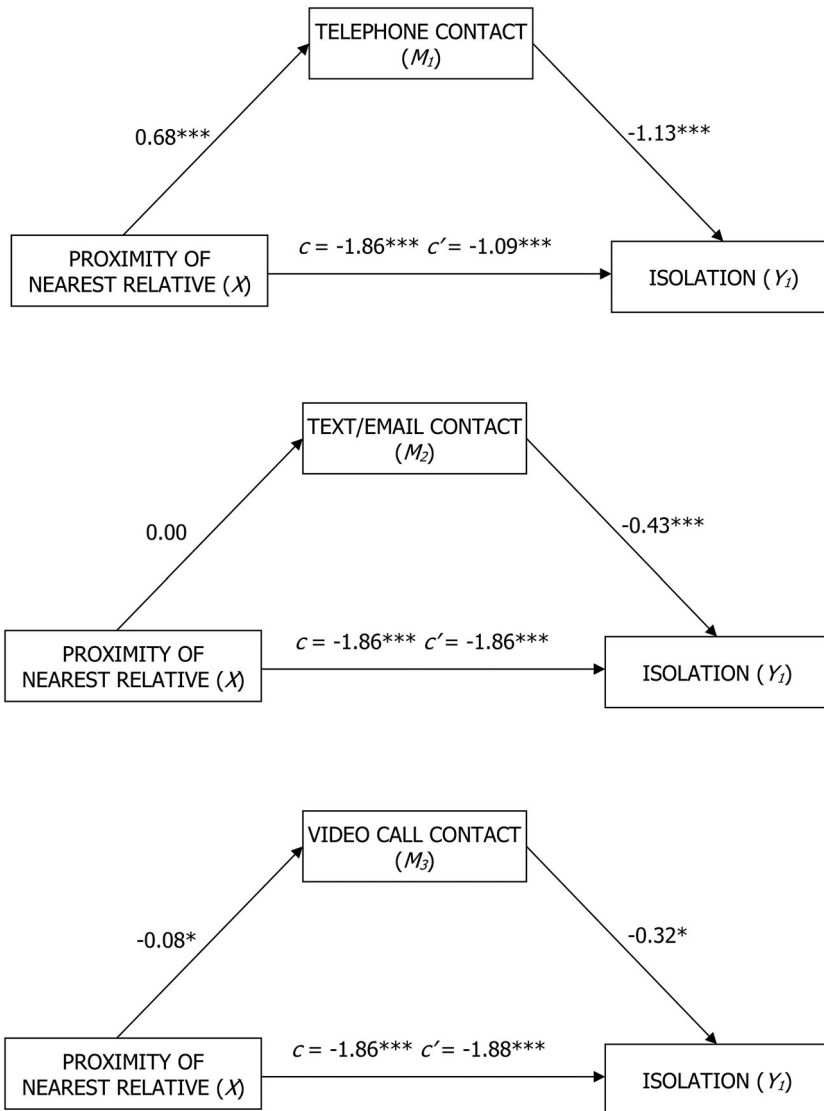
### ***Proximity to relatives, TMC use and social outcomes***

Older people were in contact with relatives by telephone more frequently than they were by text/email or video calls. More than half (58.8%) used the telephone daily or 2–3 times per week. Texts and emails were used less frequently, however around one third of the sample were in contact with relatives at least weekly. Video calls were used least frequently, with only 13.3% contacting relatives at least monthly by this means. This was supported by the qualitative data which indicated that phone calls were mentioned 798 times by participants. Texting and emailing as 'written' forms of communication were mentioned less frequently than phoning (112 occurrences: texts 78, emails 34) and video calls were mentioned least frequently, with only 39 occurrences in 13 interviews.

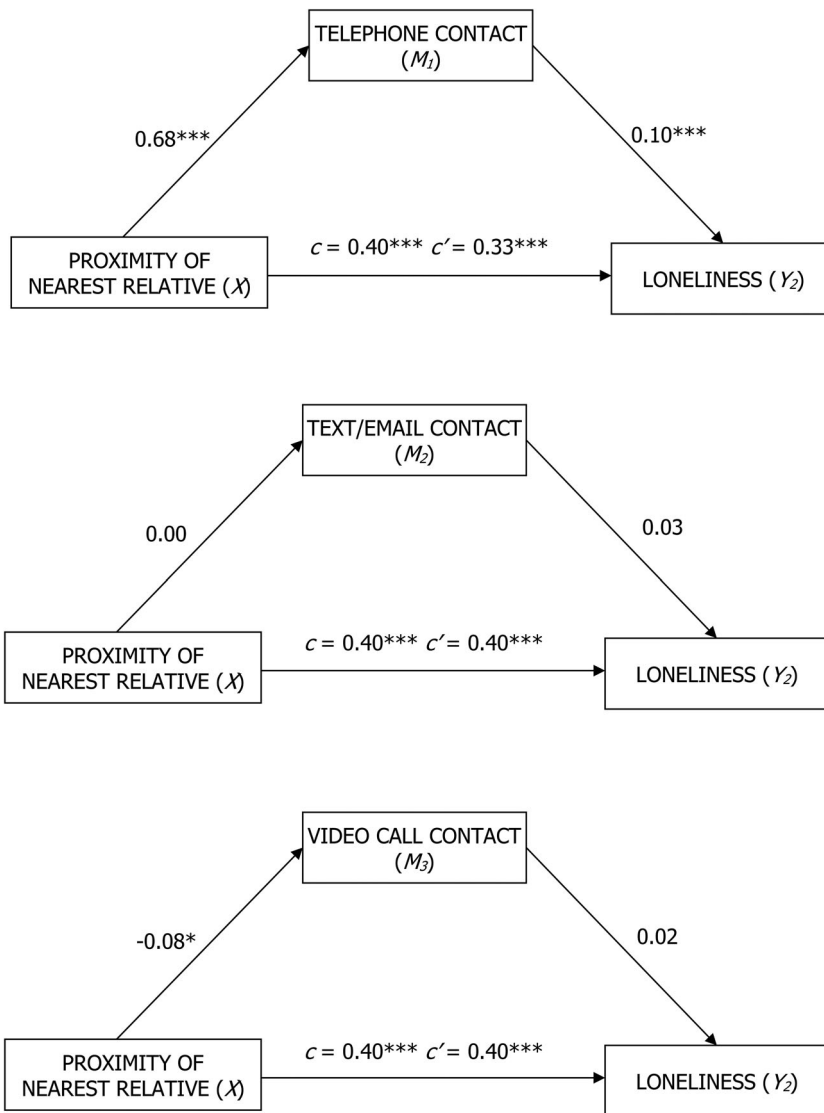
Figures 3 and 4 show the effect of proximity to a relative on the mediators ('a' paths) and the mediators' effects ( $M_1$ – $M_3$ ) on isolation ( $Y_1$ ) and loneliness ( $Y_2$ ) ('b' paths) partialing out the effect of proximity to relative and correcting for covariates which are not shown in the figures (Table 2). Proximity of relatives was associated with frequency of telephone use and video calls, but not texting and emailing. The direction of association



between proximity of relatives and frequency of telephone use was not as expected: older people living  $\geq 50$  miles from their nearest relative phoned less frequently than those who had relatives nearby ( $a = .68, p < .001$ ) (H1a). The qualitative data indicated that for older people with relatives living nearby, telephone conversations supplemented rather than replaced face-to-face contact. For example, Mr Jones (66 years, never married) lived next door to his sister and saw her three times a week, but he also phoned her frequently. Similarly, Mrs Bevan (70 years, divorced) had one daughter and three sons living within 5 miles, and had face-to-face contact and a phone call from at least one child daily.



**Figure 3.** Statistical Mediator Models Indicating the Beta Coefficients for Proximity of Nearest Relative ( $X$ ), TMC Mediators ( $M_1$ – $M_3$ ) and Social Isolation ( $Y_1$ ) as an Outcome ( $N = 2,099$ ).



**Figure 4.** Statistical Mediator Models Indicating the Beta Coefficients for Proximity of Nearest Relative ( $X$ ), TMC Mediators ( $M_1$ – $M_3$ ) and Loneliness ( $Y_2$ ) as an Outcome ( $N = 2,099$ ).

The association between distance of the nearest relative and the frequency of use of text and emails ( $a = .00$ ,  $p = .98$ ) was not significant (H1b). Although some people used texts frequently to maintain contact with relatives (e.g., Mrs Williams (80 years, widowed) texted her granddaughter everyday), on the whole, texts and emails were perceived as particularly beneficial for specific functions that were unrelated to the proximity of relatives. Texts/emails were used to pass on information (e.g., photographs, menus), to attract attention, or communicate with someone who may not want to, or be unable to speak on the phone. For example, although her son lived opposite her, Mrs Humphries (67 years, married) noted that she used texts to get her son’s attention as he was rarely

**Table 2.** Coefficients for Mediation Models: Proximity to Relative ( $X$ ) and Covariates ( $C_1$ – $C_7$ ) predicting Mediators ( $M_1$ – $M_3$ ) ( $N = 2,099$ ).

Mediator: Frequency of Predictor	Phone calls ( $M_1$ )		Text/Emails ( $M_2$ )		Video calls ( $M_3$ )	
	Coeff. (SE)	$p$	Coeff. (SE)	$p$	Coeff. (SE)	$p$
Constant	3.588 (.481)	.000	1.969 (.542)	.000	4.775 (.323)	.000
Proximity to relative ( $X$ )	.678 (.064)	.000	.002 (.072)	.980	-.083 (.043)	.052
Age $C_1$	-.006 (.005)	.214	.051 (.005)	.000	.008 (.003)	.006
Male $C_2$	.526 (.054)	.000	.498 (.061)	.000	.058 (.037)	.112
Married $C_3$	-.050 (.059)	.400	-.072 (.066)	.277	-.049 (.040)	.221
Education $C_4$	.022 (.010)	.028	-.022 (.011)	.054	-.012 (.007)	.070
MMSE $C_5$	-.048 (.010)	.000	-.068 (.011)	.000	-.017 (.006)	.008
Disability $C_6$	-.008 (.021)	.690	.054 (.023)	.021	-.003 (.014)	.835
Area Deprivation $C_7$	-.023 (.022)	.295	-.038 (.025)	.123	-.017 (.015)	.247
	$R^2 = .105$		$R^2 = .149$		$R^2 = .023$	
	$F(8, 2090) = 30.63, p < .001$		$F(8, 2090) = 45.57, p < .001$		$F(8, 2090) = 6.21, p < .001$	

available to take a phone call, ‘I text when I need something, because if he’s travelling or in a meeting, I find that texting him is easier and he phones me back.’ Mrs Evans (87 years, widowed) used text messages to contact her grandson who lived more than 50 miles away, because she perceived it as less intrusive than a phone call. ‘[I] text yes, because I don’t want to ((laughs)) ... I don’t want to wake the baby.’

Texts and emails were often used to exchange photographs between relatives. For example, Mr Hughes (66 years, married) maintained a relationship with his cousin who lived within 5 miles, through infrequent phone calls, but said, ‘if there’s photographs and things, we just email.’ Mrs Ellis (71 years, cohabiting) used text messages to facilitate social meetings with a sister, ‘I just text a picture of a coffee and she knows I’m there [in the cafe]. She’ll come down.’

Some interviews suggested that texts and emails were chosen when a message was sent to extended family members out of sense of duty (e.g., thanking for a gift, sending celebratory wishes). They were also used when either the sender or recipient wanted to exchange information or keep in touch, but not necessarily engage in a verbal conversation. The latter seemed especially pertinent following divorce. For example, Ms Morgan (68 years, divorced) had been contacted by email by her ex-husband to support a local environmental issue, while Mr Lewis (72 years, widowed) used email to keep in touch with his ex-daughter-in-law with a view to sustaining relationships with his grandchildren.

She’s now his [son] ex-wife. But nevertheless, she’s still the mother to two of my grandchildren so you know, I do keep in touch with her and yeah. Funnily enough, I, two days ago, I forgot her birthday ... and I sent her a message on the internet ... ‘Sorry, sorry I didn’t send you a card.’

Some participants found email communication onerous, given the length of some messages and the expectation of quick replies. Ms Richards (71 years, divorced) noted ‘sometimes I think it’s intrusive and I feel, oh well, gosh, you know, I’ve got to reply. I don’t seem to have the time.’

There was a weak but significant trend for older people who lived at a distance from their relatives to use video calls more frequently than those who had relatives living nearby ( $a = -.08, p = .05$ ) (H1c). The qualitative data indicated that occasional users of

video calls referred to its benefits for bringing people closer together at Christmas, birthdays or other special occasions. For example, Mrs Griffiths (74 years, married) said,

I've had one conversation with him [grandson] in nearly 2 years ... We all get together on Boxing Day and we were up at [son's house] and they put him on Skype.

Regular users valued video calls as particularly beneficial for keeping in touch with family living permanently or temporarily at a distance as observed in the statistical models. For example, Mrs Owen (65 years, widowed), had five daughters, four of whom were living in Europe or more than 50 miles away in Wales. With the exception of one daughter who lived close by and visited regularly, contact with her four other daughters was by video calls. She said, 'we Facetime, I speak to all of them.'

The total effect of proximity of nearest relative on isolation is significant ( $c = -1.86, p < .001$ ) (H2a). Similarly, the total effect of proximity of relative on loneliness is significant ( $c = .40, p < .001$ ) (H3a). As anticipated, older people with the nearest relative  $\geq 50$  miles away were significantly more isolated, and lonely than those who had a relative living within 50 miles proximity.

The direct effect of proximity of nearest relative on isolation ( $c' = -1.09, p < .001$ ) and loneliness ( $c' = .33, p < .001$ ) are significant but not as strong as the total effects. Thus, proximity to nearest relative has a significant indirect effect on social isolation ( $\hat{a}\hat{b} = -.77(95\% \text{ CI } [-.98, -.59])$ ) (H2b) and loneliness ( $\hat{a}\hat{b} = .07(95\% \text{ CI } [.04, .10])$ ) (H3b) through the mediating variable 'frequency of telephone contact' ( $M_1$ ).

Interviews indicated that phone calls had become part of the routine day-to-day practices of some older people and were used to maintain contact with relatives, thus reducing social isolation supporting the mediating effect observed in the statistical models. The mediating effect of phone calls on the association between proximity of relatives and loneliness was demonstrated in the loneliness sub-study narratives of Mr Davies (72 years, separated) and Mrs Thomas (75 years, widowed) who lived more than 50 miles away from their nearest relative. Mr Davies was lonely at both waves of data collection and said that contact with his relatives was restricted to 'bad news and that sort of thing, over the phone,' which did nothing to alleviate his loneliness. On the other hand, Mrs Thomas was bereaved and lonely at wave one, but had transitioned out of loneliness two years later. This was due, in part, to the long-distance but close relationship with her daughter, she said, 'we are, we are very close, very close, [daughter] is on the phone about four or five times a day, you know.' The qualitative data indicated that older people who were in regular phone contact with relatives, also had regular face-to-face contact, whereas those who had very little phone contact saw relatives rarely. The statistical model only accounted for 6 per cent of variance  $R^2 = 0.06$   $F(8,2090) = 18.00$   $p < .001$ , suggesting that the fit to the data may have been improved by including additional variables, such as face-to-face contact.

The direct effect (i.e., taking into account the mediator, frequency of texts or emails ( $M_2$ )) of proximity of nearest relative on isolation ( $c' = -1.86, p < .001$ ) and loneliness ( $c' = .33, p < .001$ ) are significant but identical to the total effects. Proximity to nearest relative does not have a significant indirect effect on social isolation ( $\hat{a}\hat{b} = -.00(95\% \text{ CI } [-.06, .06])$ ) (H2c) nor does it have a significant indirect effect on loneliness ( $\hat{a}\hat{b} = .00(95\% \text{ CI } [-.01, .01])$ ) (H3c) via frequency of text contact. The qualitative interviews

demonstrated that, on the whole, text and emails were used by older people for very specific functions unrelated to isolation and loneliness (see above).

The direct effect of proximity of nearest relative on isolation ( $c' = -1.89, p < .001$ ) and loneliness ( $c' = .40, p < .001$ ) are significant. While  $c'$  differs to the total effects on isolation, there is no difference between  $c$  and  $c'$  for loneliness. Proximity to nearest relative has a significant indirect effect on social isolation ( $\hat{a}\hat{b} = .03(95\% \text{ CI } [.00, .08])$ ) (H2d) but does not have a significant indirect effect on loneliness ( $\hat{a}\hat{b} = -.00(95\% \text{ CI } [-.01, .00])$ ) (H3d) via frequency of video calls.

Some participants referred to video calls compensating for a lack of face-to-face contact and reducing social isolation. For example, Mrs Rees (83 years, widowed) explained,

All the time we're Skyping, I just feel we're in touch, it's silly isn't it? ... I mean my granddaughter in [central Asian country], I'm more in touch with her than I am with anybody else in the family.

Although participants' narratives support the mediating effect of video calls on the relationship between proximity to family and social isolation, none of the interviews referred to an influence on loneliness (non-significant mediating effect in the statistical models). However, narratives did explain why contact via video calls were unlikely to reduce loneliness. Participants talked about physical embodiment (bodily presence) that could or had helped alleviate loneliness, rather than disembodied contact using TMC. For example, Mrs Thomas (see above) said,

I was sitting in the bedroom [after the death of husband], you know, feeling quite lonely, and [granddaughter] came in, she's only six then, 'oh Nanny' and she's got her arm round me ... 'I'm trying to console Nanny' she says, with her arms round me.

### **Facilitating conditions**

Table 2 shows the influence of the covariates on frequency of TMC. However, within the qualitative sub-studies, very few participants mentioned the influence of external factors on the use of TMC.

Age had no significant effect on the frequency of phone use, but greater age was associated with less frequent use of text/emails and video calls. The qualitative data suggests that less frequent use may not be related to capacity to use the equipment (see covariates for physical and cognitive function), but instead, related to fewer living relatives. For example, Mrs Hopkins (92 years, married) noted 'that's why I feel so sad and lonely sometimes because my friends and relatives, close friends and relatives, and neighbours, they've died. And um, I do miss them.'

Women made more frequently made phone calls and sent text/emails than men, but there were no gender differences in the frequency of video calls. There were no explanations for these associations available in the qualitative data.

Number of years education was significantly associated with frequency of phone calls, and text and emailing, but there was no significant association with video calls. There was an association between a greater number of years of education and less frequent phone calls to family members, while the reverse was true for texts/emails. Fewer years of education was associated with less frequent texts/emails. Several participants recounted difficulties spelling. For example, Mrs Pugh (78 years, widowed) who had only 11 years

full time education explained to the interviewer that she had given up trying to text because ‘it were hard work’ and she was ashamed of her inability to spell.

If you do anything and you know for a fact that you can’t spell it, and, you think, oh god, they’re going to think I’m a right, whatsit to see this ... I’m just so ashamed that I can’t do the same as everybody else.

Greater cognitive impairment was associated with less frequent use of all forms of TMC, while greater levels of physical impairment was associated only with less frequent use of text/emails. The qualitative data illustrated the impact of cognitive impairment on TMC use. Mrs Pugh had moderate dementia and she acknowledged that she did not make video calls because it was difficult for her to remember how to use technology, she said, ‘no. I couldn’t do it [make video calls]. I would forget. Like I’m gradually forgetting about my, this [television remote control].’

Although marital status and area deprivation did not have a statistically significant impact on the use of TMC, the qualitative data suggested that area disadvantage relating to phone and internet access impacted on its use.<sup>1</sup> Ms Morgan (68 years, divorced) explained why she was unable to make video calls. She said, ‘I’m not online ... because the reception is so bad.’

### **Price value**

There was evidence that poor broadband coverage influenced price value for some participants. For example, Ms Morgan (68 years, divorced) had extremely poor mobile phone and internet reception. She did not want to purchase a computer or smart phone to make video calls without a stable online connection and said, ‘it doesn’t seem worth it.’

One participant thought the costs associated with being taught to use a particular technology (rather than the product itself) would accrue benefits. For example, Mr Parry (81 years, widowed) was motivated to use a computer because ‘I was very lonely and there was a laptop in the front room’ which he wanted to use to video call his daughter and grandchildren. After having ‘played with it for a couple of days’ he took IT classes and English classes, as he perceived the financial outlay required to enable him to use TMC would be worthwhile. He said,

I can’t spell. ‘Don’t worry about it’ she said ‘we’ll put spell check on it’ which I didn’t know about ... I went to this first [computer class] and then I went to the English class to learn to spell ... it’s only eight pound in the taxi return.

### **Habit**

Some participants indicated that their choice of TMC was based on habit. This was only pertinent for using the telephone, which was based on long-term and routine practice. For example, Mr Parry (81 years, widowed) said,

I just like to be able to pick up the phone when I want and you know my daughter texts all the time. Oh I can’t be bothered – pick up the phone! ... I can do it [text], but my preferred method of keeping in touch is telephone. I’m old fashioned.

### **Effort expectancy**

There was little indication that effort expectancy (perceived ease of use) had an impact on the use of the telephone or texts/email (c.f. effort required for spelling in texts/emails in relation to years of education). However, there were some indications that participants perceived video calls as difficult to make, or based on previous negative experiences with technology, believed that it was not worthwhile. For example, Mr Pritchard (77 years, widowed) said,

I did try Sky [sic] with my sister-in-law, but it never worked out, her computer wasn't all that clever. I've no interest in that [video calls], too complicated for me.

### **Social influence**

Only two participants' narratives indicated some social influence on TMC use, in relation to video calls and emails. Mr Lewis (72 years, widowed) noted that his family had convinced him of the value of using video calls, and said,

Really, I suppose I've been talked into it by the family. 'Wouldn't it be a good idea Dad, if you' you know? And I think, you know, I've got more confidence online now whereas before, even two years ago I was always afraid of pressing the wrong button and doing some [damage].

Mrs Rees (83 years, widowed) was a particularly avid user of all forms of TMC (see above) and was trying to influence her sister to also adopt technology. During her interview she said, 'I'm trying to persuade her [sister living in southern England] to use an iPad, her son's got one but she says 'I couldn't' ((laughs)).'

### **Discussion**

In describing ageing and later life *with technology* we have provided a counterpoint to the portrayal of older people as technology-averse. Through theoretical triangulation we have drawn on concepts and vocabulary that is familiar to STS but viewed this through a critical gerontological lens. We acknowledge that certain barriers impede the use of TMC, but posit that there is merit in understanding motivations for adopting technologies and what they are used for. Our approach challenges some of the technology-scepticism assumptions about older people, and instead examines the day-to-day communication practices of older people in the context of family relationships.

As performance expectancy is defined as the extent to which a technology is perceived to provide beneficial outcomes, we hypothesized that that proximity of family would drive the more frequent use of TMC because of the expectation that it would bridge the physical and emotional distance between families that live apart. However, while proximity of family was associated with the frequency of use of phones and video calls, only the latter supported the hypothesized direction of association.

Texts and email are asynchronous forms of communication. A survey of texting traffic demonstrated that it is central to teenager culture but use less frequently by older people (Ling et al., 2012). In our study, text and emails served specific functions for older people (e.g., to pass on information, photographs, or to communicate with someone who may not want to, or be unable to speak on the phone) that were similar to the purposes of use

for other age groups (Licoppe, 2004). As proximity to relative was unrelated to increasing contact with family members by these means, the premise on which our statistical models were developed was unsubstantiated, and contact by text/emails did not have a significant mediating effect on the relation between distance of family and isolation or loneliness. However, we demonstrated that some older people used texting and emails as a method of managing relationships within families affected by divorce or separation. Other studies have also noted that asynchronous TMC can be 'strategic' in nature, it can be used as a form of detachment and used to deal with relationship difficulties (Licoppe, 2004).

Telephone and video calls are synchronous and require people to take the time to talk (Licoppe, 2004). As found elsewhere, most older people used telephones out of habit, and with ease (Quan-Haase et al., 2017). Familiarity contributed to little effort expectancy in phoning others. At the macrolevel, some environmental and/or political structural conditions hampered use (e.g., poor mobile coverage in some rural areas), but on the whole the telephone was the preferred method of communicating with family members. Our results demonstrated that phone calls were more frequently made by older people who lived in close proximity to a relative, and the qualitative data suggested that frequent phone calls were coupled with frequent face-to-face contact with local family. This is consistent with other research in Wales which found that it was not only the frequency of face-to-face contact that decreased over greater geographical distance from family, but the frequency of telephone contact also diminished (WRVS, 2012). On the other hand, video calls were more frequently made by older people who lived at a distance from their nearest relatives. In this respect, rather than supplementing face-to-face contact, video calls were used to compensate for embodied contact.

Performance expectancy concerns the perception of beneficial outcomes. In this respect we assumed that the beneficial outcomes related to the use of TMC would be a positive impact on isolation and loneliness. However, the experience of using TMC did not always match expectations. While both phone and video calls mediated the relationship between proximity of family and social isolation, only phone calls mediated the relationship between proximity of family and loneliness. Although the objective experience of using these forms of TMC are similar the subjective emotional experience differs.

Loneliness was defined as an unpleasant and distressing subjective phenomenon stemming from a discrepancy between individuals' desired and achieved levels of social relations (Prohaska et al., 2020). As social beings, humans seek to avoid the negative outcomes associated with unwanted social isolation (i.e., loneliness) seeking out measures to curtail these (Cacioppo et al., 2006). The inductive analysis of qualitative data suggest that older people considered physical embodiment (bodily presence) and tactile interaction as essential elements of social relationships that helped tackle loneliness: qualities that are not addressed by video calls. While phone calls did influence loneliness, this is likely because greater number of phone calls may have been also associated with greater face-to-face contact with local family.

STS have tended to depict older people as reluctant adopters of technology (Peine et al., 2014), but this was not supported by our study. The results suggest that the operationalization of performance expectancy in UTAUT models (e.g., 'usefulness in my everyday life', 'helps me accomplish things', 'increases my productivity') may be too crude to capture important distinctions between specific purposes ascribed to different



types of TMC. Performance expectancy is also built on past experiences. Thus, perceived ‘reluctance’ to adopt a technology, may be based on experiential knowledge of similar technologies that failed to deliver a positive impact. Supporting previous research on the use of ICT (e.g., Cimperman et al., 2016), we found little evidence that social influence played a role in TMC behavior. However, by examining the experiences that underpin the concepts of habit, effort expectancy, price values and facilitating conditions we can begin to understand how the social context and environment influence the use of TMC, thus, shifting the focus from individual deficits to other reasons for non-adoption. Examples include the relationship between age and TMC use, which for some older people could be understood in terms of fewer family members (e.g., siblings) of the same generation available to contact. Furthermore, poor broadband and mobile coverage in rural areas of Wales contributed to lower price value, in turn, influencing adoption.

UTAUT studies of TMC use in older populations have tended to operationalize facilitating conditions as the availability of support (e.g., Ma et al., 2016) and have not theorized about the role of other mediating factors. Examples in this study demonstrated that for some older people the relationship between age and TMC use, could be understood in terms of fewer family members (e.g., siblings) of the same generation available to contact. Furthermore, poor broadband and mobile coverage in rural areas of Wales contributed to lower price value, in turn, influencing adoption. Whilst a comprehensive review of literature on the predictors of social isolation and loneliness is beyond the scope of this paper, factors that influenced the use of TMC have also been associated with both outcomes (e.g., age, poverty, education, environment, and cognitive function) and were controlled for in our analysis (Burholt & Scharf, 2014).

At the microlevel, there was evidence that cognitive impairment influenced TMC. Some participants were reluctant to adopt technology that they were unfamiliar with, as learning new tasks became increasingly difficult with moderate dementia. For others with dementia, the ability to continue to use technology that was already part of their daily lives became increasingly challenging. Some older people were excluded from utilizing TMC because it had not been designed with cognitive impairment in mind (Blackler et al., 2020). Incorporating intuitive design in TMC may facilitate social inclusion for future cohorts of older people.

### **Limitations**

The mediation models tested six pathways to isolation and loneliness, and other models may fit the data better. For example, proximity to nearest relative is only one of the potential drivers for isolation and loneliness. Thus, focusing on other triggers such as spousal bereavement or retirement might also motivate older people to use TMC in different ways and impact on these outcomes. Moreover, virtual social interaction with friends and face-to-face contact (with friends and family) are also likely to influence social isolation and loneliness. Including these variables in future statistical models may improve the fit. Qualitative analysis relied on spontaneous and unprompted references to UTAUT concepts. In future research, explicit qualitative probes may better capture patterns of intersectionality and underlying motivations for selectivity of particular technologies over others (see e.g., Tsatsou, 2022).

## Conclusion

Critical gerontology has an important role to play in understanding and theorizing about the use of communication technology in older people's lives. We have considered distance from family as a motivating factor to use TMC and equated this to performance expectancy in a social context. Subsequently, continued motivation to use TMC is likely to be reinforced and influenced through objective experience (social isolation) or subjective experience (loneliness). Furthermore, use of TMC is influenced by factors external to the individual. We have provided an alternative way of using some concepts that are familiar to STS by drawing on gerontological theory in relation to social connections and the experience of older people themselves. Using mixed methods (statistical modeling and qualitative analysis) has helped elucidate the reasons for selectivity, and lower use of some forms of TMC (i.e., text/emails and video versus phone calls) and the purposes for which these are used. Ultimately, we propose that technology development could benefit from the theorizing about anticipated outcomes and acknowledging implicit bias arising from the social construction of ageing.

We have demonstrated that the concepts used in STS in relation to adoption of technologies can be interpreted differently when older people's experiences are used to explain the reasons for (non)use. Understanding the link between the individual, the social-cultural and social structural environment, social interaction, and loneliness requires an acknowledgement of what is important to older people. For example, knowledge concerning the role of embodied presence in alleviating loneliness can be used to better understand the likelihood of implementing successful interventions. Furthermore, innovation in STS has frequently focused on assistive technologies especially for people living with dementia. Understanding TMC in the everyday life of a person living with cognitive impairment suggests that there is a need to consider inclusivity and the development of communication products that can facilitate enjoyable social interaction. New products may benefit from taking an intuitive design approach that is based on communication 'habits' learned over the lifecourse rather than learning new strategies. In the future, transdisciplinary research integrating theoretical and methodological approaches would shift the focus from 'solutions for deficits' in old age, towards addressing issues confronting older people and enhance real-world impact in the field of aging and technology mediated communication.

## Note

1. At the time of the study the WIMD did not include a measure of digital access, this was amended in 2019.

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## Data availability statement

The data underlying this article are available in the UK Data Service. SN: 8281, doi:10.5255/UKDA-SN-8281-1.

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