Original Manuscript

SOUTHERN GERONTOLOGICAL SOCIETY

Journal of Applied Gerontology
1–9

DOI: 10.1177/0733464820982147
journals.sagepub.com/home/jag
SAGE

Can Online Communication Prevent Depression Among Older People? A Longitudinal Analysis

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Abstract

Evidence on the association between internet usage and incidence of depression remains mixed. We examined the associations between different categories of internet usage and developing clinical depression. We used data from the 2013 and 2016 waves of the Japan Gerontological Evaluation Study (JAGES) comprising 12,333 physically and cognitively independent adults aged ≥65 years. Participants were engaged in seven categories of internet usage: communication with friends/family, social media, information collection about health/medicine, searching for medical facilities, purchase of drugs and vitamins, shopping, and banking. We found that internet use for communication had a protective influence on the probability of developing clinical depression defined as the Geriatric Depression Scale scores ≥5 or self-reported diagnosed depression. Our findings support the role of online communication with friends/family in preventing clinical depression among older people. Online communication could be particularly useful in the COVID-19 crisis because many families are geographically dispersed and/or socially distanced.

Keywords

depression, internet use, online communication, social interaction, social distancing, COVID-19

Introduction

Late-life depression is a serious public health issue, associated with high mortality, morbidity, and decreased physical, cognitive, and social function (Blazer, 2003; Fiske et al., 2009; Wei et al., 2019). The proportion of the global population with depression in 2015 was estimated at more than 7% among females aged 65 to 79 years, and above 5% among males (World Health Organization, 2017). In addition, late-life depression often remains undetected among community-dwelling people. Among older people aged 50 years or older, bereavement, disability, prior depression, and female gender are important risk factors for depression (Cole & Dendukuri, 2003). Modifiable protective factors that have been shown to reduce the incidence of depression include the provision of emotional support and promoting social interactions (Berkman et al., 2014; Cole & Dendukuri, 2003; Gariepy et al., 2016).

A growing number of older adults, defined as people aged 65 years or older, are connected to the internet today. For example, the proportion of internet users aged 65 years or older in the United States reached 73% in 2019 (Pew Research Center, 2019). Similar trends are found in Japan: The proportion of internet users among Japanese people aged 65 years or older has reached 63.6% in 2019 (Ministry of Internal Affairs and Communications, 2020). The internet has changed daily life in several ways. It enables people to communicate with friends and family remotely; to search for useful information easily (e.g., health-related information); to perform instrumental activities such as shopping and banking from home; and especially in the era of the COVID-19 pandemic, to telecommute to work.

Several studies have focused on the role of the internet in alleviating depressive symptoms among older people, but with mixed findings. Cotten et al. (2014) reported that internet

Manuscript received: August 19, 2020; **final revision received:** October 20, 2020; **accepted:** November 27, 2020.

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usage was found to reduce the probability of depression by 33% in a longitudinal study using the data from 2002 to 2008 among retired people over the age of 50 years in the United States. Another longitudinal study using relatively recent data from 2012 to 2015 among Korean adults aged 50 years or older showed that internet use lowered depression, partially mediated by an improvement in social relationship satisfaction (Jun & Kim, 2017). A cross-sectional study conducted in China in 2016 also showed that internet usage was associated with lower depression levels among adults aged 60 years or older (Wang et al., 2019). By contrast, some studies reported no direct association between internet usage and depression. For example, two cross-sectional studies and a longitudinal study conducted between 2008 and 2011 among older people showed no significant association between internet use and depression/depressive symptoms (Elliot et al., 2014; Erickson & Johnson, 2011; Hamer & Stamatakis, 2014). A meta-analysis that retrieved studies that had been published from 2001 to 2012 showed the overall mean weighted effect size of computer and internet interventions for depression was not statistically significant (M. Choi et al., 2012). Another meta-analysis published in 2010 even suggested a small detrimental effect of internet usage on psychological well-being (Huang, 2010), although this study included the general population and age was assessed as a moderator while no significant effect modification was found. It should be pointed out, however, that these negative findings were based on relatively old data. Considering the rapidly increasing availability of the internet among older people, studies using data reflecting current situations are required to examine the role of internet use today.

The inconsistencies across studies of the impacts of internet use on depression may be attributable partly to the challenges of teasing out reverse causality—for example, people with depression/depressive symptoms might be less likely to use the internet. As the existing evidence on the relationship between internet use and depression is mostly based on cross-sectional data, the use of longitudinal data to establish temporality is warranted.

Another explanation is insufficient differentiation between alternative uses of the internet. Although older people use the internet for various purposes, many studies focused on a crude comparison between users versus nonusers. van Boekel et al. (2017) identified four groups of usages in a latent class analysis based on the internet activities among older adults aged 65 years and older in the Netherlands: practical users (engaging in practical and financial activities), minimizers (low-frequency use), maximizers (high-frequency use for various activities, including "chatting, video calling, sending messages."), and social users (engaging in social media and online games). Practical users and maximizers reported higher psychological well-being than minimizers and social users. Szabo et al. (2019) reported that social use (connecting with friends/family) indirectly affected well-being via decreased loneliness and instrumental (e.g., banking) and informational uses (e.g., reading health-related information) indirectly affected well-being via engagement in a wider range of activities. These findings suggest that the impacts of internet use among older people might vary according to purposes, although these studies did not focus on depression. Because of the close and bidirectional relationship between loneliness and depression, online communication might be an effective tool for preventing loneliness and depression in older people (National Academies of Sciences, Engineering, and Medicine, 2020). Especially, during the COVID-19 pandemic, loneliness among older people is a serious problem because of their greater vulnerability to the virus, and hence their greater need to comply with social distancing guidelines (Killgore et al., 2020). Thus, it is of particular interest whether online communication with friends/family can substitute for face-to-face communication particularly for socially isolated people (Ball et al., 2019).

Using data from two waves of the Japan Gerontological Evaluation Study (JAGES) (Kondo, 2016), we assessed specific categories of internet usage among older people defined as aged 65 years or older and how each relates to the incidence of depression longitudinally. We hypothesized that internet use for communication (connecting with friends/family) would be more protectively related to depression than internet use for other purposes such as informational (e.g., health-related information) or instrumental uses (e.g., shopping and banking).

Method

Study Population

We used data from the 2013 and 2016 waves of the JAGES (Kondo, 2016). JAGES is a nationwide population-based gerontological cohort in Japan focusing on the social determinants of health and functional disability. It originated from a smaller survey called the Aichi Gerontological Evaluation Survey (AGES) conducted in Aichi prefecture in 1999. Following the first survey, five waves were conducted in 2003 to 2004, 2006 to 2007, 2010 to 2011, 2013, and 2016. The project was renamed JAGES in 2010 because the survey covered all the major islands in Japan (except for Shikoku). In fact, the surveys conducted in 2013 and 2016 included 137,736 older adults from 30 municipalities and 180,021 older adults from 39 municipalities from rural and urban areas in Japan, respectively (response rate = 71.1% and 70.2%). JAGES is based on questionnaires mailed to older people, defined as aged 65 years or older, who were physically and cognitively independent and were not receiving benefits from the national public long-term care insurance scheme. A census was done for all residents in municipalities with fewer than 5,000 eligible residents, while random sampling was used in large municipalities with 5,000 or more eligible residents. Our data were drawn from respondents

who entered JAGES in the 2013 wave and who were followed up in the 2016 wave (n = 61,267). The 2013 wave of the JAGES data set consisted of five modules. The questions about internet usage were included in one of the five modules. The subsample consisted of 12,333 older adults residing in both rural and urban areas. Among them, our analytic sample was people without clinical depression at baseline, n = 9,199 in the observed (unimputed) data set. Participants were informed that returning the questionnaire indicated their consent to participate.

Clinical Depression

Depressive symptoms were assessed by the short form of the Geriatric Depression Scale (GDS), consisting of 15 questions (GDS-15; score range: 0–15; Cronbach's α = .80; Burke et al., 1991; Nyunt et al., 2009). Higher scores indicate more depressive symptoms. Participants with GDS-15 scores of 5 or greater were considered to be indicative of clinically significant depression (area under the receiver operating characteristic curve = 0.98; Nyunt et al., 2009). Clinical depression was defined as GDS-15 scores ≥5 or self-reported diagnosis of depression.

Internet Usage and Categories of Internet Use

As part of the study, participants indicated whether they used the internet in the past year. In addition, participants were asked to indicate the use for different purposes on a yes/no basis to the following seven categories: (a) communication with friends/family, (b) social media including Facebook and Twitter, (c) information collection about health and medicine, (d) searching for medical facilities, (e) purchase of drugs and vitamins, (f) shopping, and (g) online banking. Participants could select more than one purpose when they engaged in them.

However, communication with friends/family and engagement in social media might overlap for some participants. To address the issue of misclassification, we conducted a sensitivity analysis in which the seven purposes of internet use were collapsed into three categories: (a) social use (communication with friends/family and social media), (b) instrumental use (shopping, purchase of drugs and vitamins, and banking), and (c) informational use (information collection about health and medicine and searching for medical facilities) (Szabo et al., 2019). These categories were analyzed as binary variables: set to 0 if participants answered "No" to any of the items, otherwise set to 1.

Control Variables

We adjusted for a series of demographic factors, physical health conditions, socioeconomic status, and physical social interaction at baseline as potential confounders.

Demographic factors included age and gender because both of them can affect depression levels and the probability of internet use (World Health Organization, 2017).

Physical health is often associated with depression (Hsu, 2009), and people with physical problems might seek information about health problems on the internet or might communicate online with family/friends to share their concerns. Hence, we included the instrumental activities of daily living, which is a validated 13-item self-reported index (score range: 0–13; Koyano et al., 1991), and the number of chronic diseases (diabetes mellitus, cardiovascular diseases, respiratory diseases, stroke, and cancer) as indicators of physical health.

Socioeconomic status has been also associated with depression/depressive symptoms (Gero et al., 2017; Hoogendijk et al., 2014; Shiba et al., 2017) and internet use (Nicole & Eszter, 2009): Thus, educational attainment (<10 or ≥10 years), occupational status (currently employed or unemployed), and annual equivalized income (<2 million yen or ≥2 million yen) were evaluated. Marital status (married or unmarried) and living arrangement (living alone or not) were assessed because of the connections with depression (Honjo et al., 2018; Yan et al., 2011) and their expected effect on internet use.

As an index of physical social interaction, we included the frequency of meeting friends (<once a week; ≥once a week), which was associated with depression (Chao, 2011; Schwarzbach et al., 2014), because people who met their friends frequently might be more likely to use the internet to communicate online with their friends. Some people also might use the internet to compensate for fewer offline interactions (e.g., with families that live far away).

Emotional social support was also associated with depression (Schwarzbach et al., 2014). However, people with no emotional social support might not use the internet for communication because of a lack of resources (i.e., friends/family to talk online) or older people may use the internet as a way to seek such support (Quan-Haase et al., 2017). It was assessed with the following question: "Do you have someone who listens to your concerns and complaints?"

Statistical Analysis

All data were analyzed using STATA 16.0 software (STATA Corp. LLC, College Station, TX, USA). All continuous values were expressed as mean (standard deviation [*SD*]), and categorical variables were reported as percentages in Tables 1 and 2. Pearson's correlation coefficients were calculated among the purposes of internet use. We used logistic regression models to examine how categories of internet use at baseline relate to the onset of clinical depression at the follow-up survey. Our analytic sample in the logistic regression was people without clinical depression at baseline, n = 9,199 in the observed (unimputed) data set. Our basic model was as follows:

Table 1. Characteristics of Internet Nonusers and Users Without Clinical Depression at Baseline.

Variable	Internet nonusers (n = 6,236)	Internet users (n = 2,167)
Developing clinical depression	709 (11.7%)	162 (7.7%)
Age	73.7 (5.6)	71.0 (4.7)
Gender (male)	2,490 (39.9%)	1,339 (61.8%)
Instrumental activities of daily living	11.9 (1.5)	12.2 (1.1)
Number of diseases	0.3 (0.6)	0.3 (0.6)
Unmarried	1,618 (26.5%)	323 (15%)
Living alone	765 (12.9%)	182 (8.5%)
Income (2 million yen)	2,387 (47.0%)	1,411 (71.8%)
Educational attainment (10 years or more)	3,245 (52.6%)	1,852 (85.7%)
Current working	1,419 (25.3%)	640 (30.5%)
Meeting friends ≥once a week	3,342 (55.8%)	1,164 (54.6%)
No emotional social support	205 (3.4%)	65 (3.0%)
Purpose of internet use		
Communication with friends/family		1,129 (52.1%)
Social media		374 (17.3%)
Information collection		903 (41.7%)
Searching for medical facilities		366 (16.9%)
Purchase of drugs and vitamins		68 (3.1%)
Shopping		514 (23.7%)
Banking		387 (17.9%)

Note. Data were missing in 796 people for the variable internet use/purposes among people without clinical depression at baseline (n = 9,199).

$$\begin{aligned}\text{Logit}\Pr[\text{Depression}_{2016} = 1 \mid \text{Internet use}_{2013}, X_{2013}] &= \alpha_0 + \beta_{0*}\text{Internet use}_{2013} \\ &\quad + \beta_1 * X_{2013} + \varepsilon,\end{aligned}$$

where logit probability of clinical depression in 2016 was regressed on internet use in 2013 and a vector of confounding factors in 2013 (X_{2013}). α_0 represents the intercept and ε the residual term. The associations of interest are expressed in the coefficients β_0, or $e^{\beta 0}$ in terms of odds ratio (OR). Seven categories of internet usage were included simultaneously in the logistic model. We did not include product terms in the logistic regression model because we found no evidence of significant effect modification by all confounding variables (age, gender, instrumental activities of daily living, the number of chronic diseases, educational attainment, occupational status, marital status, living arrangement, the frequency of meeting friends, and emotional social support) in the association between internet use for seven purposes and developing clinical depression.

After estimating the logistic regression models, average marginal effects (AMEs) were obtained for clear interpretations as we cannot straightforwardly interpret and compare coefficients/OR as we can in linear regression models (Mood, 2010). AMEs estimate the average of predicted changes in the probability of developing clinical depression for a one-unit increase in a particular variable controlling for other covariates.

We conducted two sensitivity analyses. First, we applied a logistic regression model in which the seven purposes of internet use were collapsed into three categories: social use (communication with friends/family and social media), instrumental use (shopping, purchase of drugs and vitamins, and banking), and informational use (information collection about health and medicine and searching for medical facilities). Second, we conducted linear regression analyses in which the GDS score (continuous variable) in 2016 was used as an outcome variable. We did not exclude people with clinical depression at baseline and included GDS in 2013 to adjust for depressive symptoms at baseline in the sensitivity analysis.

We conducted multiple imputation analyses with the Markov chain Monte Carlo method under the assumption that data were missing at random to address potential bias due to missing data (Rubin, 1997). Data were missing in 9.9% for the variable internet use/purposes, 15.5% for GDS in 2013, and 18.0% for GDS in 2016. The missing data for other variables were less than 10% except for equivalized income (17.3%). We created 20 imputed data sets and combined the effect estimates using Rubin's rule (Rubin, 1996).

Results

Of internet nonusers, 11.7% developed clinical depression, whereas 7.7% of internet users developed clinical depression (Table 1). Older adults who were younger and male and had higher household income and educational attainment were more likely to use the internet. The most common category of internet use was communication with friends/family (52.1%), whereas social media was used by only 17.3% of

Table 2. Characteristics of People Using the Internet for Each Purpose.

	People using the Internet for						
Variable	Communication with friends/ family (n = 1,129)	Social media (n = 374)	Information collection (n = 903)	Searching for medical facilities (n = 366)	Purchase of drugs/ vitamins (n = 68)	Shopping (n = 514)	Banking (n = 387)
Developing clinical depression	71 (6.4%)	32 (8.9%)	76 (8.6%)	38 (10.7%)	8 (12.5%)	42 (8.4%)	28 (7.4%)
Age	71.2 (4.7)	70.6 (4.7)	71.2 (4.7)	71.8 (4.7)	71.1 (4.5)	70.6 (4.6)	71 (4.6)
Gender (male)	700 (62.0%)	272 (72.7%)	549 (60.8%)	217 (59.3%)	39 (57.4%)	305 (59.3%)	307 (79.3%)
Instrumental activities of daily living	12.3 (1)	12.1 (1.3)	12.3 (1)	12.3 (1)	12.2 (1.1)	12.3 (1)	12.2 (1.1)
Number of diseases	0.3 (0.5)	0.3 (0.6)	0.3 (0.6)	0.4 (0.6)	0.3 (0.5)	0.3 (0.6)	0.4 (0.6)
Unmarried	157 (13.9%)	49 (13.2%)	132 (14.7%)	67 (18.5%)	8 (11.8%)	78 (15.2%)	46 (11.9%)
Living alone	98 (8.8%)	36 (9.8%)	82 (9.2%)	41 (11.5%)	4 (6.2%)	34 (6.7%)	24 (6.3%)
Income (2 million yen)	771 (74.5%)	240 (70.2%)	612 (74.2%)	229 (69.4%)	33 (55.9%)	345 (73.6%)	278 (79.0%)
Educational attainment	992 (88.3%)	319 (85.5%)	778 (86.3%)	308 (84.4%)	54 (79.4%)	447 (87.1%)	350 (90.4%)
Current working	319 (29.0%)	137 (37.4%)	266 (30.4%)	91 (25.6%)	16 (24.6%)	145 (29.2%)	119 (31.9%)
Meeting friends ≥ once a week	653 (58.5%)	200 (54.9%)	450 (50.6%)	180 (49.9%)	31 (47.0%)	285 (56.0%)	199 (52.4%)
No emotional social support	28 (2.5%)	20 (5.4%)	22 (2.5%)	11 (3.0%)	1 (1.5%)	13 (2.5%)	16 (4.2%)

Note. Columns show the characteristics of people who used the internet for the seven purposes.

internet users. Men and women used the internet for communication almost equally (men: 52.3%; women: 51.8%). The second most common purpose was information collection about health and medicine (41.7%).

Of internet users for communication purposes, 6.4% developed clinical depression, whereas 7.4% to 12.5% of internet users for other purposes developed clinical depression (Table 2). Internet banking was used mainly by men (79.3%). Other characteristics were roughly comparable among the seven different purposes of usage. We found a moderate association between internet use for information collection about health and medicine and searching for medical facilities (correlation coefficient = .36, $p < .01$), while other bivariate correlations were weak or null (Supplemental Table 1).

The logistic regression models showed that internet use for "communication with friends/family" at baseline was associated with lower odds of developing clinical depression at follow-up (OR: 0.68; 95% confidence interval [CI] = [0.51, 0.89], $p = .005$), whereas any other purposes did not show significant association with clinical depression in the follow-up survey (Table 3, Supplemental Table 2). The AME of internet usage for communication on developing clinical depression was −0.033 (95% CI = [−0.054, −0.013]): The predicted probability of developing clinical depression was on average 3.3% points lower in internet users for communication with friends/family (predicted probability: 11.45% [10.62%–12.29%]) than in people not engaging in communication with friends/family via the internet (predicted probability: 8.11% [6.18%–10.05%]). A sensitivity analysis in which the seven categories of internet use were collapsed into three categories showed that social use (communication with friends/family and social media) at baseline was associated with lower odds of developing clinical depression at follow-up (OR: 0.74; 95% CI = [0.59, 0.94], $p = .01$), whereas instrumental use or informational use did not show significant association with clinical depression in the follow-up survey (Supplemental Table 3).

Another sensitivity analysis applying linear regression model using the GDS as a continuous variable (score range: 0–15) showed the same trend, although the association was marginally significant: Internet users for communication with friends/family showed lower GDS at follow-up by 0.14 after adjusting for GDS and confounding factors at baseline (β: −0.14 [−0.27 to 0.001], $p = .052$; Supplemental Table 4).

Discussion

This study examined distinct purposes for internet use among people aged 65 years or older and how each relates to clinical depression longitudinally. Our findings illustrate that internet use for communication has a protective influence on the probability of developing clinical depression. However, other purposes of internet use showed no protective association with developing clinical depression.

It is of particular interest whether online communication can be an alternative to face-to-face communication for people who do not or cannot interact with others in person. In this study, the frequency of meeting friends was included as an index of physical social interaction. We found

Table 3. Associations Between Internet Usage for Seven Purposes and Developing Clinical Depression at Follow-Up.

Purposes of Internet usage	β [95% CI]	AME [95% CI]	OR [95% CI]
Communication with friends/family	−0.39 [−0.66, −0.12]	−0.033 [−0.054, −0.013]	0.68 [0.51, 0.89]
Social media	0.00 [−0.40, 0.40]	0.00 [−0.038, 0.038]	1.00 [0.67, 1.49]
Information collection	−0.01 [−0.34, 0.32]	−0.001 [−0.032, 0.031]	0.99 [0.71, 1.38]
Searching for medical facilities	0.33 [−0.13, 0.79]	0.036 [−0.018, 0.09]	1.39 [0.88, 2.21]
Purchase of drugs and vitamins	0.15 [−0.78, 1.08]	0.017 [−0.083, 0.117]	1.16 [0.46, 2.94]
Shopping	−0.03 [−0.42, 0.36]	−0.002 [−0.039, 0.034]	0.97 [0.66, 1.44]
Banking	−0.11 [−0.52, 0.30]	−0.01 [−0.047, 0.026]	0.89 [0.59, 1.35]

Note. Controlled for age, gender, instrumental activities of daily living, number of diseases, marital status, living arrangement, equivalized income, educational attainment, current working, the frequency of meeting friends, and emotional social support. AMEs can be interpreted as the higher/lower probability of developing clinical depression than the reference group (internet nonusers). AME = average marginal effects; CI = confidence intervals; OR = odds ratio.

the protective association of online communication with developing clinical depression with no effect modification of confounding variables including the frequency of meeting friends, suggesting that people can benefit from online communication equally, regardless of whether they meet their friends in person. The same might apply for interaction with family members. Although we did not assess the frequency of meeting with family members in this study, living alone would reflect it to some extent: People living alone have less interaction with family members. Our findings suggest that people living alone can benefit from online communication as well as people living with their family.

Although we did not examine pathways linking online communication with the prevention of depression, some of the findings from a longitudinal mediation study by Szabo et al. (2019) might be applicable to our study, that is, virtual interactions with others affected well-being via a decreased sense of loneliness as well as increased social engagement. The findings suggest a role for online communication in creating offline social networks, which is also a plausible pathway linking online communication with the prevention of depression, considering the close relationship between loneliness/social engagement and depression (National Academies of Sciences, Engineering, and Medicine, 2020). However, direct mechanisms, not via offline social activities, may also be involved. For example, video talking with family/friends and online social activities/events might increase the range and diversity of social connections (Barbosa Neves et al., 2019). In the era of COVID-19, the direct effects of online communication need to be investigated urgently.

This study did not show a significant relationship between social media use and developing clinical depression. Social media also provides opportunities to communicate with others, but communication on social media (e.g., posting, reading, and checking messages/pictures) may differ from phone/video talking and sending messages to friends/family. Nevertheless, some participants might engage in both forms of media (phone/video talking as well as social media) to communicate with friends/family. The sensitivity analysis in which communication with friends/family and social media usage were collapsed into a single category of "social use" supported our main finding, that is, online communication might prevent developing depression. However, further studies are required to examine which type of online communication can be effective to prevent depression.

Methods of connecting to the internet (e.g., phone, tablet, and computer) might determine or pose barriers for how people use the internet for communication. For example, if people do not have a smartphone, they would not be able to communicate with friends using apps available only on smartphones. The increasing availability of smartphones may provide more opportunities for older people to communicate with their friends. However, larger screen sizes for tablets and computers might be more suitable for some older adults to text, read, and use apps. Future interventions need to take into consideration what type of devices is appropriate for promoting online communication among older people.

In contrast to some previous findings, informational uses (information collection and searching for medical facilities) and instrumental uses (shopping and banking/brokers) were not associated with developing clinical depression. van Boekel et al. (2017) identified four groups of internet usages in a latent class analysis, and practical users (engaging in practical and financial activities) showed better psychological well-being, although it was a cross-sectional association. Szabo et al. (2019) also reported that instrumental (e.g., banking) and informational uses (e.g., reading health-related information) indirectly affected well-being via volunteering in a wider range of activities in a longitudinal study. There are two explanations for this inconsistency. First, the outcome in the previous studies was well-being but not depression or depressive symptoms. Second, our study measured individual's information collection about health, medicine, and medical facilities in contrast with the study by Szabo et al. (2019) which also measured searching for information about music/entertainment. Online information seeking about things of their interest might encourage people to engage in community activities and volunteering (N. G. Choi & Dinitto, 2013), but it would not be applicable to people seeking information about health-related problems.

Limitations

There are some limitations to this study. First, we could not fully identify the causality of the relationships. Although we excluded people with clinical depression at baseline to deal with reverse causality and adjusted for a series of potential confounders, there may still be unmeasured confounders. Second, we could not measure internet usage and confounding factors between the two study periods. Thus, we had to assume that these variables had remained the same during the time period, although they might have changed over the period. Third, the proportion of internet users among people aged 65 years or older in this study (25.8%) was lower than that reported in the Communications Usage Trend Survey conducted by the Ministry of Internal Affairs and Communications in 2013 (50.5%; Ministry of Internal Affairs and Communications, 2013). The Communications Usage Trend Survey might overestimate the number of internet users because the questionnaires of the survey were mailed and e-mailed, whereas those of JAGES were mailed only. Although the ratio of mail and e-mail in responses to the Communications Usage Trend Survey is not available, it is plausible that internet users are more likely to reply to the questionnaires than internet nonusers, leading to a greater proportion of internet users than reality. However, JAGES might underestimate the proportion of internet users because some mobile phone internet users might be misclassified as internet nonusers in this study because some of them might answer "no" to the question "Did you use the internet or email in the past year?" Unfortunately, we could not identify which device was used for online communication. However, if online communication via mobile phones plays a protective role in developing depression, which is a plausible assumption, the association between online communication and developing clinical depression could be underestimated. Fourth, the types of online communication were not identified. Some might talk to friends/family online and others might send emails and/or messages to them. It remains unclear whether there is a specific type of online communication to prevent depression. Finally, we did not assess the frequency of internet use. The impact of online communication is presumably small among less frequent users. In addition, addictive use of the internet, particularly social media, has become an area of increasing research interest (Longstreeta & Brooks, 2017). Further studies are needed to figure out the appropriate frequency of online communication for preventing depression.

Conclusion

In a few decades, almost all older people, at least in developed countries, will be internet users because of a birth cohort effect, that is, the generation who grew up with the internet are aging. However, for current older people who have never used the internet as a young adult, there are several obstacles to use the internet, such as a lack of knowledge/support and negative perceptions of the internet. However, if we can convince older people to use the internet even once, the experience might increase self-efficacy (Adams et al., 2005). In one well-known case study of a rural agribusiness collective in a remote area of Japan, community developers demonstrated that older people (older than 70 years) could be successfully trained in the use of the internet (Hashimoto, 2012). This was accomplished by developing specialized hardware (e.g., large roller-ball mouses) and easy-to-use interfaces that could be navigated by older people. Today, many such devices and apps have been developed, making it easier for older people to use the internet. We should also focus on non-engineering aspects such as providing the information they want in an accessible way and activities they can enjoy easily to convince older people to adopt the internet. Online communication with friends/family could be an example of a persuasive portal to the internet. Our findings support the role of online communication with friends/family in preventing clinical depression among older people. Online communication could be particularly useful among older adults today as families are often geographically dispersed and, because of their vulnerability to the COVID-19, an alternative to face-to-face communication is required in the era of social distancing.

Authors' Note

This project was conducted with the support of the Takemi Program in International Health at Harvard T.H. Chan School of Public Health. The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the respective funding organizations.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Japan Society for the Promotion of Science (JSPS) KAKENHI Grant Numbers (JP15H01972, JP15H04781, JP15H05059, JP15K03417, JP15K03982, JP15K16181, JP15K17232, JP15K18174, JP15K19241, JP15K21266, JP15KT0007, JP15KT0097, JP16H05556, JP16K09122, JP16K00913, JP16K02025, JP16K12964, JP16K13443, JP16K16295, JP16K16595, JP16K16633, JP16K17256, JP16K19247, JP16K19267, JP16K21461, JP16K21465, JP16KT0014, JP22330172, JP22390400, JP22390400, JP22592327, JP23243070, JP23590786, JP23790710, JP24390469, JP24530698, JP24653150, JP24683018, JP25253052, JP25713027, JP25870573, JP25870881, JP26285138, JP26460828, JP26780328, JP26882010, JP20H00557); Health Labour Sciences Research Grants (H22-Choju-Shitei-008, H24-Junkankitou-Ippan-007, H24-Chikyukibo-Ippan-009, H24-Choju-Wakate-009, H25-Kenki-Wakate-015, H25-Irryo-Shitei-003, H26-Choju-Ippan-006, H27-Ninchisyou-Ippan-001, H28- Choju-Ippan-002, H28- Ninchisyou-Ippan-002, H30-Junkankitou-Ippan-004); the Research and Development Grants for Longevity Science from the Japan Agency for Medical Research and Development (AMED;

16dk0110017h0002, 16ls0110002h0001, JP20dk0110034); the Research Funding for Longevity Sciences from National Center for Geriatrics and Gerontology (24-17, 24-23, 30-22, 20-19); and Grants from Japan Science and Technology Agency (JST-OPERA: JPMJOP1831).

Research Ethics

Ethical approval for the study was obtained from the Ethics Committee at Chiba University (approval number: 2493) and the National Center for Geriatrics and Gerontology (approval number: 992).

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Data Availability

Data are from the Japan Gerontological Evaluation Study (JAGES) study. All enquiries are to be addressed at the data management committee via e-mail: dataadmin.ml@jages.net. All JAGES data sets have ethical or legal restrictions for public deposition due to inclusion of sensitive information from the human participants.

Supplemental Material

Supplemental material for this article is available online.

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