

모바일 미디어 기술과 주거형태에 따른 노인 자살생각 완화 연구

Investigation on the Mitigation of Suicidal Thoughts in the Elderly Depending on Mobile Media Technology and Living Arrangement

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요약

초고령화 사회에서 증가한 독거노인의 인구는 많은 문제들을 야기하고 있다. 홀로 살아가고 있는 노인들은 상실감과 자살 생각이 높아질 수 있음에 따라 본 연구는 주거형태와 스마트폰이 이들의 상실감과 자살 생각에 미치는 영향을 분석하였다. 본 연구에서 2G폰을 사용하는 노인들은 스마트폰을 사용하는 이들보다 낮은 사회적 역할과 관계를 느끼는 것으로 나타났다. 또한, 가족 구성원 또는 배우자와 함께 살고 있는 노인들은 독거노인들보다 낮은 자살 생각을 하는 것으로 밝혀졌다. 그렇지만 사회적 역할과 관계의 상실감은 거주 형태보다 스마트폰의 사용 실태 여부에 더 유의한 영향을 받는 것으로 나타났다. 게다가, 스마트폰을 사용하는 노인들은 사회적 역할과 관계에 대해 낮은 수준의 상실감을 보여주고 있는 것으로 나타났다. 노인들 사이에서 신체적 건강, 사회적 역할, 관계의 상실감은 자살 생각을 높이는 주요한 요인으로 밝혀졌다는 점에서 놀랍게도 경제적 능력만이 자살 생각의 지표가 아니었음을 확인하였다.

■ 중심어 : | 모바일 미디어 | 완화 | 자살생각 | 노인 |

Abstract

In the super-aged societies, an increased elderly population living in solitude has been causing many problems. Since the elderly may incur a sense of loss and interest in suicide when living alone, this study investigated the effects of smartphones as well as types of living arrangements on elderly peoples' sense of loss and suicidal thoughts. This study found social roles and relationships were lower for older individuals using smartphones than those using 2G phones. Not surprisingly, those living with family members or a partner had significantly fewer suicidal thoughts than those living in solitude. However, our results indicate subjects' loss of role and relationships was affected more significantly by their smartphone usage (2G phone vs. smartphone) rather than their living arrangements (i.e., living with family or a partner vs. living in solitude). Moreover, smartphone users showed a lower sense of loss in terms of social roles and relationships. Among the elderly, loss of health, social role, and relationships were identified as precedents for increased suicidal thoughts; yet, economic capacity was surprisingly not an indicator of suicidal thoughts.

■ keyword : | Mobile Media | Mitigation | Suicidal Thoughts | The Elderly |

I. Introduction

The number of smartphone users continues to grow every year worldwide. This population was estimated to be 2.53 billion as of 2018, and it is anticipated to soon hit 3 billion[1]. A smartphone is distinguished from a 2G phone by its functionalities, which include 3G/LTE networks, third-party applications, an open operating system(OS), and full browsing features[2]. The wide-ranging distribution of smartphones has made it far easier to access the internet and utilize a variety of applications and contents including games, e-books, music, videos, and social network services(SNS).

The world's elderly population is growing, and while most people would welcome the prospect of a longer life, the increased numbers of the elderly worldwide precipitates heretofore unencountered social problems. As cited by [3], the United Nations(UN) defines a society as "aging" if 7% of its population is over 65, "aged" if the percentage of 65-year-olds surpasses 14%, and "super-aged" when 20% or more of a population is 65 or older. While [4] predicted that South Korea would join the super-aged club by 2030, a mere three years later [3] reported that it had already reached the "aged" distinction. This may indicate the number of super-aged societies could be increasing more rapidly than previously thought.

The UN report World Population Ageing 2017 estimated that the population of persons aged 60 years or older will quadruple by 2050 from their numbers in 1980[5]. Reasons for the increase in elderly populations worldwide differ according to the economic status of their countries. Increased elderly populations have increased in low- and middle-income countries

thanks in part to improved mortality rates in the young[6], while higher income countries, such as South Korea, owe their increased numbers to improved life expectancy in the elderly[7]. As the world's elderly population increases, the overall wellbeing of older people is quickly becoming an important issue to all peoples[8].

According to the modernization theory by [9], elderly people are gradually losing jobs, and their positions are being filled by younger people as their societies continue to go through dramatic changes. Older people who lost central social roles due to structural transformation of their society complain about psychological loss for various reasons[10].

A sense of loss occurs when a person is no longer close to objects or people meaningful to them or when life changes so dramatically that a person can no longer maintain the standards of life to which they are accustomed or reach their previously-set goals[11]. In general, older people experience psychological loss with regard to 4 aspects after retirement: physical health, economic capacity, relationships, and social role[10]. People's sense of loss regarding relationships is an emotional reaction to losing connection with the organization or organizational members where they once belonged[12]. A sense of loss regarding physical health is caused by the decline of the physiological functions and the increasing prevalence of chronic diseases, which are the result of natural human aging[13]. A sense of loss with regard to economic capacity is the result of the economic poverty one experiences as income decreases after retirement[14]. A sense of loss also occurs when one's social roles and relationships are diminished due to the

limitations of mobility caused by aging[15].

This sense of loss can affect various aspects of an individual's life, and, at times, can cause a psychosocial imbalance. More concretely, there is a risk that people may experience negative emotions when they are unable to overcome the sense of psychosocial loss[16]. Studies report that such individuals may eventually develop suicidal thoughts[17]. Suicidal thoughts are defined as a spectrum of thinking behaviors ranging from thinking about no longer wishing to live to planning actual suicide[18].

Although suicidal thoughts do not necessarily lead to suicidal behaviors[19], this is still quite a serious matter, as most people who demonstrate suicidal behaviors tend to begin with suicidal thoughts[20]. It is known that elderly individuals have demonstrated a higher rate of suicidal thoughts than other age groups due to various socioenvironmental factors[21]. Furthermore, choices throughout one's lifetime can influence their overall life expectancy positively or negatively[22].

Mobile technology facilitates communication between users, and without being bound by limited mobility, the elderly can reach beyond their walls to likeminded peers anywhere in the world. Instead of being limited to their most immediate contacts, many of whom they may be unable to sympathize with, cellphones with their instant communication capabilities and limitless information access could provide the lonely elderly with an easy-to-use, unassisted, and affordable means of communication. Advances in mobile technology can provide peace of mind to an older person as well as their families with ever-increasing biometric recording data that could, very foreseeably in

the near future, recognize when the user falls or whose vital signs change dramatically.

1. Research Questions

The number of the elderly using smartphones has been increasing recently, owing to the development and distribution of information and communication technology(ICT). Existing studies have found that older people's use of ICT, such as smartphones, has a positive effect on their life satisfaction and successful aging[23][24]. This is because older people are relatively more isolated from fast-paced modern society, and ICT increases the channels they can use to communicate with others as well as their opportunities for diverse social activities[24]. As indicated above, the use of smartphones by retired senior citizens who are relatively socially disconnected increases the opportunities for various social interactions, which can help them find emotional stability through communication. In particular, loneliness and depression caused by, for example, family conflict or loss of a spouse are considered important factors in suicidal ideations[25].

Since aging populations are emerging as a serious social issue in numerous countries, the present study investigates cellphone usage in elderly Koreans. The smartphone usage rate in South Korean adults aged 60 years or more was recorded at approximately 14.3%, which is just about one fifth of the average total population of South Korea[26]; thus, elderly Koreans were chosen as subjects for convenience and because they represent a rising global cellphone user demographic. This study compares and analyzes empirically the effect of smartphone use on the sense of loss and suicidal thoughts of elderly

Koreans living with family or a partner and those living alone, which are the two most common living arrangements for the elderly. The study's purpose is to help older people improve their quality of life and to ensure their successful aging through ICT. Based on this, the present study established two research questions:

RQ1: Does mobile technology(2G and smartphones) reduce suicidality in the elderly more than their living arrangements(i.e., living with family or a partner and living alone)?

RQ2: What loss factors drive the suicidal thoughts of older people?

II. Methodology

1. Participants and Data Collection

To address the research purposes, this study applied a cross-sectional survey design that explored recent social phenomenon during a relatively short time[27] and purposive sampling method to target a specific population[28]. Based on the following, inclusion criteria of the current study were set at (a) individuals over the age of 65, (b) with cellphones, and (c) with clear information about their living arrangements. The data collection was conducted with the intercept data collection technique at preassigned locations, where target samples are likely to congregate. Specifically, the data were collected at two local community centers and three department stores with large floating populations in Seoul, South Korea for one month starting from February 5 to March 6 in 2018 (i.e., for 30 days). Prior to data collection, all research participants were

informed about research purposes, and all respondents voluntarily answered the paper-based survey using the self-administration method.

To investigate the sense of loss and suicidal thoughts experienced by older people, respondents of the survey were limited to those aged 65 or older. According to the World Health Organization(WHO)[29], the chronological age of 65 years is considered as a definition of the elderly in many countries. Additionally, in Korea, where this study was conducted, the Welfare of Older Persons Act defines the elderly as those who are 65 years old or older[30]. Therefore, the present study also defined the respondents as at least 65 years or older. Questions concerning smartphone use and living arrangements, which are independent variables of this study, determined in which group respondents were placed. For this reason, the questions were attached along with the demographic questionnaire of the survey. Respondents were asked to select from one of three options to ascertain the type of cellphone they owned: (a) smartphones (b) 2G phones, and (c) no cellphone. The question regarding the respondents' living arrangement(e.g., "What is your current living arrangement?"), which was another independent variable, separated respondents into two groups: those who live alone and those who live with others, such as family or friends. As a result, the survey participants were categorized based on their answers to questions dealing with smartphone usage(2G or smart phone) and living arrangements(living with family or a partner or living alone).

2. Instruments

The Korean Geriatric Suicidal Risk Scale(KGSRS), which was developed for the Korean cultural context by [31], was used to measure older people's sense of loss. The 4 subcategories(i.e., health: "I miss the old days when I was healthy," relationships: "I feel sad that people don't need me anymore," economy: "I feel frustrated, because I can't do things I want to do because of lack of money," and role: "I feel depressed, because I lost my role in society") consisted of 18 items in total. From [31], this scale showed excellent reliability scores(health, $\alpha = .94$; relationship, $\alpha = .88$; economy, $\alpha = .90$; role, $\alpha = .81$). Questions were measured on a 5-point Likert scale from 1("I strongly disagree") to 5("I strongly agree").

The Suicidal Ideation Scale, or SIS[32], is a tool developed to measure suicidal thoughts. A Korean version, modified by [33] showing acceptable internal consistency of reliability($\alpha = .74$), was used in this study. This tool consists of 4 questions in total(e.g., "I have thought about suicide" and "I have thought that my life will likely end in suicide"). The tool applies a 5-point Likert scale from 1 point("Never") to 5 points("Always").

3. Data Analysis

An exploratory factor analysis(EFA) was conducted to test the validity of the survey data. The principal component analysis was applied for factor extraction, and Varimax was applied for factor rotation. A reliability test was conducted using Cronbach's alpha to test the internal consistency of the questions. Factorial multivariate analysis of variance(factorial MANOVA) was conducted to comparatively analyze the differences in the sense of loss and suicidal thoughts experienced by the elderly

based on smartphone usage(2G or smart phone) and living arrangements(living with family or a partner or living alone). The factorial MANOVA considered the main effects of the two independent variables(i.e., the use of smartphones and living arrangements) and the interaction between the two grouping variables on the sense of loss and suicidal thoughts experienced by the elderly. The causality of variables was tested using multiple regression analysis.

III. Results

1. Descriptive Statistics

A total of 350 questionnaires were distributed for the survey, and 273 copies were retrieved. The analysis was finally conducted for the 244 copies that had complete answers, since 29 questionnaires with missing answers were excluded. Based on the study objective, all participants were aged 65 years or older. Of these, female respondents($n = 132$, 54.1%) outnumbered the males($n = 112$, 45.9%). There were 133 respondents living with their family or a partner(54.5%), and 111 were living alone(45.5%). Additionally, 121 were using a 2G phone(49.6%), while 123 possessed a smartphone(50.4%).

2. Scale Validity and Reliability

An exploratory factor analysis with Varimax of older people's sense of loss(18 items) and suicidal thoughts(4 items) was conducted. The Kaiser Meyer-Olkin(KMO) measure identified the sample adequacy for the analysis(KMO = .810), exceeding the criteria(.70)[34]. Barlett's test of sphericity($\chi^2 = 3014.152$, $df = 231$, $p <$

.001) was statistically significant. The extracted 5 factors(i.e., health, economic capacity, role, relationship, and suicidal thoughts) had eigenvalues greater than 1 and factor structure coefficients greater than .40. The factors accounted for 70.919% of the total variance.

All Cronbach's alpha results showed acceptable internal consistency for reliability based on the .70 cutoff[35]: (a) Health($\alpha = .888$), (b) Economic capacity($\alpha = .902$), (c) Role($\alpha = .907$), (d) Relationship($\alpha = .790$), and (e) Suicidal thoughts($\alpha = .853$).

Table 1. Results of validity and reliability

	1	2	3	4	5
Economical Capacity ($\alpha = .902$)	.910	-.059	-.042	-.031	-.027
	.879	.021	.009	-.016	.053
	.860	-.052	.011	-.016	-.079
	.820	-.011	-.019	.044	-.022
	.767	-.034	-.061	.048	.058
Health ($\alpha = .888$)	-.022	.866	-.095	.102	-.049
	-.074	.862	-.106	.087	.048
	-.021	.834	-.040	.000	.069
	-.048	.804	-.005	.062	.101
	.024	.764	-.109	.073	.010
Social Role ($\alpha = .907$)	-.062	-.080	.897	.111	.063
	.008	-.093	.894	-.006	.067
	.029	-.046	.882	.009	.020
	-.086	-.129	.835	.139	.055
Suicidal Thoughts ($\alpha = .853$)	.007	.011	.070	.842	.156
	.045	.123	.089	.841	.143
	.023	.058	.033	.804	.104
	-.036	.110	.047	.787	.121
Relationship ($\alpha = .790$)	.051	.087	.014	.110	.805
	-.060	.022	.050	.124	.784
	-.052	-.002	.073	.075	.752
	.059	.056	.044	.188	.746
Eigenvalue	4.138	3.827	3.626	2.217	1.795
Variance %	18.807	17.397	16.481	10.076	8.158

3. Factorial Multivariate Analysis of Variance

The results indicated no statistically significant differences for interaction between the two grouping variables: smartphone usage and types of living arrangements(Wilks' $\Lambda = .977$, $F(5, 236) = 1.103$, $p > .05$). The main effect of smartphone usage on subjects' sense of loss and suicidal thoughts was statistically significant(Wilks' $\Lambda = .921$, $F(5, 236) = 4.062$, $p < .05$). Univariate tests for (a) loss of social role

and (b) loss of relationship were statistically significant. However, the other tests were not statistically significant: (a) loss of health, (b) loss of economic capacity, and (c) suicidal thoughts, as shown in [Table 1]. Similarly, types of living arrangements on subjects' sense of loss and suicidal thoughts were also statistically significant(Wilks' $\Lambda = .910$, $F(5, 236) = 4.460$, $p < .05$). Univariate tests for all factors of sense of loss except suicidal thoughts were not statistically significant[Table 2]. Additionally, all average scores of factors were presented in [Table 3].

Table 2. Results of MANOVA by groups

Source	DV	df	MS	F	p
Smartphone Usage	ST	1	.030	.046	.831
	SR	1	17.025	15.497	.000***
	HE	1	.090	.114	.736
	RE	1	4.391	5.238	.023*
	EC	1	.700	.674	.413
Living Arrangement	ST	1	13.162	19.754	.000***
	SR	1	.379	.341	.560
	HE	1	.586	.740	.391
	RE	1	1.573	1.876	.172
	EC	1	2.225	2.135	.145
Smartphone Usage * Living Arrangement	ST	1	.065	.097	.755
	SR	1	2.703	2.434	.120
	HE	1	.014	.018	.894
	RE	1	.961	1.146	.285
	EC	1	1.232	1.182	.278

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; ST = Suicidal thoughts; SR = Social role; HE = Health; RE = Relationship; EC = Economical capacity.

Table 3. Mean scores of dependent variables

		ST	SR	HE	RE	EC
Living together	2G	1.96	3.11	2.772	2.41	2.90
	Smartphone	1.91	2.36	.83	2.27	2.86
Living alone	2G	2.49	2.82	2.89	2.70	2.95
	Smartphone	2.41	2.50	2.91	2.30	3.20

Note. ST = Suicidal thoughts; SR = Social role; HE = Health; RE = Relationship; EC = Economical capacity.

4. Multiple Regression

According to the results of the multiple regression analysis, the regression model's explanatory power was 13.6% with $F = 9.408$, $p = .000$, $R^2 = .136$. With regard to subjects' sense of loss, relationships($t = 4.701$, $p = .000$), health($t = 2.572$, $p = .011$), and role($t = 2.162$, p

= .032) increased suicidal thoughts, while loss of economic capacity($t = .438, p = .662$) was not statistically significant, as shown in [Table 4].

Table 4. Results of multiple regression

Model	B	SE	β	t	p
(Constant)	.741	.301		2.461	.015*
Role	.104	.048	.134	2.162	.032*
Health	.151	.059	.159	2.572	.011*
Relationship	.262	.056	.287	4.701	.000***
Economic	.022	.050	.026	.438	.662

* $p < .05$, ** $p < .01$, *** $p < .001$.

IV. Discussion

The present study compared and analyzed the influence of the elderly's smartphone usage and living arrangement on their sense of loss and suicidal thoughts. It found that the use of smartphones strengthens continuous communication with acquaintances and expands opportunities for social participation, which reduces the sense of loss in elderly Koreans.

It further suggests that suicidal thoughts could be reduced through living arrangements, namely interactions with family, rather than through smartphone usage alone. An important finding in the current study is that the elderly's sense of loss is statistically and significantly associated with suicidal thoughts. [36] suggested that older people's quality of life may be affected depending on how they manage their sense of loss and negative emotions, and this claim reinforces the significance of this study's results. The use of ICT-based smartphones means much more than convenience or technological innovation. It is a tool that is instrumental in ensuring healthy lives for the elderly, who comprise a growing section of many societies.

Older people who used to serve central roles in society are relatively marginalized due to aging and have difficulties in maintaining social roles and relationships[10]. The current study found that older South Koreans' loss of role and relationships was more significantly affected by their smartphone usage(2G phone vs. smartphone) than their living arrangements(i.e., living with family or a partner vs. living in solitude).Subjects who used a smartphone showed a lower sense of loss in terms of the two categories(i.e., social roles and relationships).

However, the emergence of smartphones based on ICT has allowed the elderly to communicate efficiently with others and has also increased opportunities for them to participate in diverse social activities[16][24][37]. That is, the spread and use of ICT can have a positive influence on the life of the elderly[23]. In fact, the result of an analysis of 1,000 smartphone users conducted jointly by the market survey agencies, Trendmonitor and E-survey, revealed smartphone owners primarily use their devices' SNS features to communicate with their acquaintances. The next most commonly used smartphone features were schedule and time management and work productivity improvement. Only 9.6% of the respondents said they rarely do anything else other than calling with their smartphones[38].

In this context, [39] concluded that those who use smartphone are in a broader social network compared to those who use 2G phones after conducting a personality score matching test of 4,180 elderly retirees. Further, expanding one's social network can help the elderly to alleviate the feeling of disconnectedness from the

society and to reduce a sense of isolation and loss[40]. Smartphones, which combine functions of the internet and a cellphone, allow users to communicate not only with those who live close by but also with those who live and far away. Elderly users had more opportunities for social participation, which reduced their sense of alienation and loss. However, this study found no significant difference in the elderly's sense of loss in terms of physical ability and economic power irrespective of their living arrangement or smartphone use. This result indicates that these two types of sense of loss are an important social problem for the elderly that needs to be addressed.

Regardless of smartphone usage, a significant difference was observed in terms of the suicidal thoughts experienced by the group living with family or a partner and the group that was living alone. The analysis showed that elderly people who live alone had more suicidal thoughts than those living with family or a partner. Noteworthy to this finding is that elderly individuals living alone are more prone to social isolation and solitude than the latter[41]. Moreover, a psychological imbalance had been identified as an influential factor that contributed to suicidal thoughts[42]. These findings suggest that individuals who live with older people are not simply viewed by the elderly as people who share the same living space, but as living partners with whom they can develop emotional bonds. Additionally, the current study indicates that elderly individuals who live alone and use a smartphone contemplate suicide less than those who lived alone and did not use a smartphone. Even though the difference was statistically insignificant, this finding offers a valuable

implication: it implies the possibility that using smart devices may have a positive effect on the psychological status of older people.

The elderly's feelings of loss regarding psychological wellbeing, health, role, and relationships were identified as precedents for increasing suicidal thoughts; economic capability was the only exception in this case in our study. In general, older people experience a situation where their role in society shrank due to aging[8], and they end up suffering a sense of loss in many aspects[9]. This unaddressed sense of loss may lead the elderly to experience other factors that further deteriorate their quality of life, such as depression[43], anxiety[44], anger or helplessness[45], or regret or frustration with life[46]. This is a serious problem, because negative emotions could possibly drive people to entertain suicidal thoughts[17].

Unsurprisingly, the current study demonstrated that psychological loss is a precedent that leads elderly individuals to entertain suicidal thoughts. One interesting point here is that economic loss did not have a significant effect on older people's suicidal thoughts. In this study, the elderly considered the loss of roles or relationships due to the loss of their jobs and their declining health due to aging a great loss in life, but material aspects such as economic loss did not form a significant part of their feelings of loss. This suggests that older people value emotional stability and health more than material stability.

V. Conclusion and Limitations

Although this study on smartphone use and suicidal thoughts in older Koreans and

produced meaningful results, it is not without a few limitations. First, it was conducted in Seoul, Korea's metropolitan city which has a higher smartphone penetration rate and relatively more communications networks than many-if not most-countries around the world. Such a location may not yield general results applicable to the global populace, especially considering the uniqueness of the lifestyles of elderly Koreans. Conducting future studies in various countries and regions and collecting diverse data would draw more detailed results.

Furthermore, having only four weeks for data collection might be a limitation of the research design. Such cross-sectional data collected in a relatively short period of time may have limitations in understanding comprehensive and fast-changing human psychology. Also, the target sample of this study was the elderly, which limited the sample population to only those capable of coming to the data collection sites. Other limitations of this study are the frequent changes and rapid development of mobile technologies, including smartphone technology. If a longitudinal study design is applied to future studies, these factors might be more significant.

Finally, there are many factors that can predict behaviors of smartphone users other than those used in this study. The period for which one has used a smartphone, daily average smartphone use, and primary activities done with smartphone are good examples of predictable behavior. Such variables are crucial factors to understand the influence of smartphone on subjects. Future studies would produce more meaningful results in understanding technology and human psychology if these and similarly diverse factors

are studied.

This study analyzed the factors of smartphone usage and living arrangements to obtain meaningful results on how this correlates with feelings of loss or suicidal thoughts. However, since the use of various electronic devices, including smartphones, did not take into account social communication with acquaintances, there is a need for further in-depth research on this topic. Future studies should also be conducted considering the various types of living arrangements.

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