

Factors Related to Acceptance to Use Care Technologies for Bathing Among Middle-Aged Adults: A Cross-Sectional Study

Sakiko Itoh^{a,b}, Kentaro Watanabe^c, Hiroyasu Miwa^c, Tomoko Ikeuchi^d, Tomoko Wakui^{d,b}

^a Department of Genome Informatics, Graduate School of Medicine, Osaka University, Suita, Osaka, Japan

^b Health Services Research and Development Center, University of Tsukuba, Tsukuba, Ibaraki, Japan

^c Service Value Augmentation Research Team, Human Augmentation Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Kashiwa, Chiba, Japan

^d Human Care Research Team, Tokyo Metropolitan Institute of Gerontology, Itabashi, Tokyo, Japan

Abstract

A dearth of evidence remains regarding the acceptance of care technologies by middle-aged adults that will need long-term care in the future. Therefore, we identified the factors associated with the acceptance of care technologies for bathing among middle-aged adults in Japan. Of the 1937 participants, 1553 participants were willing to receive bathing assistance from care technologies. The factors positively related to the acceptance of care technologies were female sex and higher educational levels.

Keywords:

Technology, Self-Help Devices, Middle Aged.

Introduction

Care technologies can prolong the independence of community-dwelling older adults, improve their quality of life, and reduce the burden on formal and informal caregivers [1]. The utilization of care technologies presents a possible solution to the aging population, such as the increasing demand for care and the growing variety of care needs.

A variety of assistive devices for bathing have been developed in recent decades. However, acceptance of care technologies is still low among older adults, and little is known about the acceptance of care technologies among middle-aged adults [2]. Therefore, we assessed whether middle-aged persons were willing to use care technologies for bathing and identified the factors that influence acceptance of such technologies.

Methods

Study Design and Participants

The cross-sectional survey was conducted in August 2020 using questionnaire websites to target people throughout Japan. The target population in this study was middle-aged adults (i.e., 40–64 years) that will need long-term care in the future.

Participants were recruited by a research company. This online panel methodology allowed us to target specific demographics and characteristics self-reported by respondents when they signed up for the panel. The target population was calculated according to the population composition by area of residence (eight areas), sex, and age based on the 2020 basic resident registration system in Japan.

Technology Acceptance

The decision to accept or reject a particular technology depends on various factors. The technology acceptance model (TAM) is frequently used to explain acceptance. Particularly, TAM 3 presents a nomological network of the determinants of individuals' technology adoption and use [3,4]. With these models as a guide, we focused on the experience of using technologies (i.e., computers and social networking services) in daily life.

Procedures

We analyzed the data of respondents who answered the item about care technologies designed to support bathing. In the items, we measured willingness to use care technologies to support bathing with the question, "Imagine a situation in which you are older and need care. Would you be willing to receive care for bathing through technologies?" The response options of the questions about the acceptance of the use of technologies to support bathing were *yes*, *no*, and *refuse to answer*. As for current technology use, the frequency of use of computers and social networking services (SNSs) was ranked from 1 to 5 (*never to nearly every day*).

Statistical analysis

To investigate the factors related to willingness to use care technologies for bathing, we ran logistic regression analysis using the bivariate of "willingness to use the technologies" as the dependent variable. All odds ratios (ORs) were calculated with potentially relevant variables: age, sex, education level, income, spouses, children, household composition (i.e., whether or not they live with others), care experience as an informal or formal caregivers, frequency of use of computers and SNSs, place of receiving care when care is needed, and subjective health status. All potentially relevant variables were included in the models unless there was strong evidence of collinearity, as reflected by a variance inflation factor greater than 10. Participants who had survey items that they refused to answer were excluded from the analyses. Statistical analyses were performed using Stata 16 (StataCorp. 2019). The results

Table 1. Logistic regression analysis of factors associated with using care technologies for bathing

Variables	Multivariable OR (95% CI)	p-value
Age range, years		.708
40–44	1 (ref)	
45–49	0.87 (0.60–1.28)	
50–54	0.83 (0.55–1.23)	
55–59	0.77 (0.52–1.15)	
60–64	0.94 (0.63–1.40)	
Sex		.005*
Male	1 (ref)	
Female	1.43 (1.11–1.83)	
Education level		.030*
High school and below	1 (ref)	
Junior college	1.20 (0.88–1.65)	
University and above	1.45 (1.10–1.91)	
Income		.080
<19,000 USD	1 (ref)	
19,000–38,999 USD	1.24 (0.84–1.84)	
39,000–58,999 USD	1.23 (0.81–1.86)	
59,000–78,999 USD	1.08 (0.70–1.67)	
79,000–98,999 USD	1.10 (0.68–1.77)	
≥99,000 USD	2.01 (1.20–3.38)	
Spouse		.971
No	1 (ref)	
Yes	0.99 (0.70–1.41)	
Children		.313
No	1 (ref)	
Yes	0.86 (0.65–1.15)	
Household composites		.804
Live alone	1 (ref)	
Live with others	0.95 (0.65–1.39)	
Care experience		.077
No	1 (ref)	
Yes (informal caregiver)	1.14 (0.86–1.52)	
Yes (formal caregiver)	0.63 (0.40–1.01)	
Frequency of use of computers		.552
Never	1 (ref)	
A few times per year	1.10 (0.68–1.76)	
Nearly every day	1.22 (0.83–1.77)	
Frequency of use of SNSs		.114
Never	1 (ref)	
A few times per year	1.28 (0.94–1.75)	
Nearly every day	1.30 (1.00–1.69)	
Preferred place to receive care		.089
Home	1 (ref)	
Nursing home	1.33 (1.01–1.76)	
Unknown and Other	1.26 (0.96–1.67)	
Subjective health		.591
Very poor	1 (ref)	
Poor	1.58 (0.77–3.26)	
Average	1.83 (0.89–3.74)	
Good	1.66 (0.84–3.29)	
Very good	1.63 (0.75–3.57)	

*p < .05. Multivariable ORs were adjusted for all variables. OR = odds ratio, CI = confidence interval, SNS = social networking service, USD = United States Dollars.

of logistic regression were shown as odds ratios (OR) with 95% confidence intervals (95%CI). The threshold for statistical significance was set at p < .05.

Ethical considerations

Ethical considerations were examined in accordance with the guidelines for research ethics in Japan. This study was approved by the Institutional Review Board at Tokyo Metropolitan Institute of Gerontology, Japan (approval number: 47).

Results

The total number of 1937 participants aged 40–64 years were included in the analysis. Slightly more participants were male (50.7%). 1486 (76.7%) participants used computers nearly every day, 834 (43.1%) used SNSs nearly every day, 474 (24.5%) had experience as an informal caregiver, and 106 (5.5%) had experience as a formal caregiver. The majority ($n = 1553$; 80.2%) of the participants were willing to use care technologies designed to support bathing.

As shown in Table 1, the outcome revealed that people who were willing to use care technologies for bathing were significantly more likely to be women ($p = .005$) and had a higher level of education ($p = .030$).

Conclusions

We revealed that people who were willing to use care technologies for bathing were significantly more likely to be women and had a higher level of education. The results may be helpful in the development of technologies designed to support bathing and in the promotion of care technologies for middle-aged adults who will need care in the future.

Acknowledgments

Preparation of this manuscript was supported by grants from JSPS KAKENHI (Grant-in-Aid for Scientific Research B) Grant Number 19KT0022.

References

- [1] Krick T, Huter K, Domhoff D, Schmidt A, Rothgang H, Wolf-Ostermann K: Digital technology and nursing care: a scoping review on acceptance, effectiveness and efficiency studies of informal and formal care technologies. *BMC Health Serv Res* 2019, 19(1):400.
- [2] Peek ST, Wouters EJ, van Hoof J, Luijckx KG, Boeije HR, Vrijhoef HJ: Factors influencing acceptance of technology for aging in place: a systematic review. *Int J Med Inform* 2014, 83(4):235-248.
- [3] Viswanath Venkatesh HB: Technology acceptance model 3 and a Research Agenda on Interventions. *Decision Sciences* 2008, 39(2):273-315.
- [4] Ha J, Park HK: Factors Affecting the Acceptability of Technology in Health Care Among Older Korean Adults with Multiple Chronic Conditions: A Cross-Sectional Study Adopting the Senior Technology Acceptance Model. *Clin Interv Aging* 2020, 15:1873-1881.

Address for correspondence

Sakiko Itoh, Department of Genome Informatics, Graduate School of Medicine, Osaka University, 2-2 Yamadaoka, Suita, Osaka 565-0871, Japan.

Email: itoh@gi.med.osaka-u.ac.jp