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# A study of the user experience of medication management: exploring the factors influencing the behavioural intentions of elderly people using the smart product-service system based on the UTAUT model.


## Abstract

With the rapid development of the Internet, intelligent clouds and advances in physical technology, a new generation of production systems has emerged as products interact more closely with the web. In this context, Smart Product-Service Systems (SPSS) have become an essential area of research. According to research, SPSS can help older people improve adherence to medication management. However, the views of older people are rarely taken into account. Also, according to previous studies, some older people are reluctant to use SPSS.
Therefore, this study used a quantitative research to explore the factors of behavioural intentions influencing the use of SPSS among older people. The study's findings provide strategies for developing and improving SPSS to improve the user experience of older people.


## Introduction

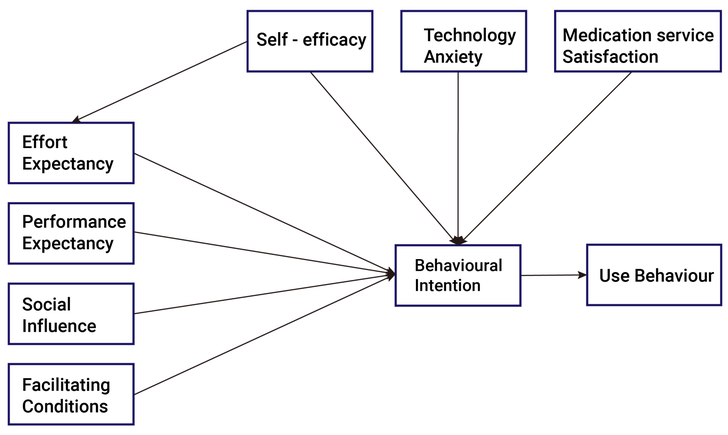
With the global COVID-19 pandemic, people's lives have been severely affected, especially the elderly with chronic conditions who have complex medication regimens and need to take different medications daily (Rochon PA, 2019). Moreover, older people need to remain independent at home and self-manage taking their medications to reduce outside exposure. The ability to manage medication is the cognitive and physical ability to follow a treatment regimen prescribed by a physician (Advinha, 2017.). However, low medication adherence is common among older patients in medication management (Hughes, 2004 ). Therefore, medication management for the elderly is a huge challenge. As medication management in the elderly is a complex process, the user's use of the product has evolved from the product to the value of the service (Valencia, Ana, et al., 2015). The SPSS system that includes multiple stakeholders as additional services has excellent potential for medication management in the elderly. However, the existing studies found that there has been an effort to build a systematic framework for the SPSS model, and most of them present the SPSS solution from the service provider's perspective, which is used to enhance the value of the commercial aspects ( Imran et al., 2017). Also, there are often barriers to the use of SPSS among older people, so the adoption of SPSS among the elderly is low (Nimrod, 2018). Therefore, It is essential to explore the adoption of SPSS from the perspective of the elderly.

## Literature Review

Much of the previous research on SPSS has focused on the provider's perspective on implementing and managing SPSS to improve the business value. However, little attention has been paid to the views of the elderly, for example:
Study home monitoring systems for health management (M. Nalini, 2021). Medication management through information recognition (Ervasti, 2011).
Determine if the use of automated home medication dispensers improves medication adherence. (Hoffmann, Charles, et al., 2018).

## Theoretical Framework

Theoretical UTAUT is a model developed by Venkatesh and other scholars in 2003 that is an integration of eight theories (Venkatesh et al. , 2003).
UTAUT has four basic structures. PE, EE, SI, FC. in addition, in the context of SPSS I have extended three other structures through literature review analysis. TA, SE, MSS.




## Methodology:

A quantitative survey was used in this study with a questionnaire consisting of a five-point Likert scale and the items measured in the questionnaire were constituted through a literature review.
A simple random sample was conducted and the target group: people over 65 years of age. No cognitive impairment and some experience with mobile phone use.
Analytical methods: descriptive statistics, reliability and validity tests(Leguina, 2015), confirmatory factor analysis(CFA), structural equation modelling (SEM).

## Result & Discussion

| Construct | Items | Loadings | AVE | CR | Cronbach's alpha |
|---|---|---|---|---|---|
| Performance expectancy | PE1 | 0.761 | 0.598 | 0.856 | 0.855 |
| | PE2 | 0.769 | | | |
| | PE3 | 0.790 | | | |
| | PE4 | 0.775 | | | |
| Effort expectancy | EE1 | 0.743 | 0.627 | 0.870 | 0.868 |
| | EE2 | 0.841 | | | |
| | EE3 | 0.810 | | | |
| | EE4 | 0.769 | | | |
| Social influence | SI1 | 0.750 | 0.627 | 0.847 | 0.844 |
| | SI2 | 0.738 | | | |
| | SI3 | 0.733 | | | |
| | SI4 | 0.824 | | | |
| Facilitating conditions | FC1 | 0.751 | 0.612 | 0.887 | 0.885 |
| | FC2 | 0.789 | | | |
| | FC3 | 0.860 | | | |
| | FC4 | 0.741 | | | |
| | FC5 | 0.763 | | | |
| Technology anxiety | TA1 | 0.852 | 0.594 | 0.879 | 0.878 |
| | TA2 | 0.741 | | | |
| | TA3 | 0.752 | | | |
| | TA4 | 0.733 | | | |
| | TA5 | 0.768 | | | |
| Self-efficacy | SE1 | 0.783 | 0.634 | 0.873 | 0.871 |
| | SE2 | 0.792 | | | |
| | SE3 | 0.845 | | | |
| | SE4 | 0.762 | | | |
| Behavioural intention | BI1 | 0.830 | 0.635 | 0.839 | 0.838 |
| | BI2 | 0.759 | | | |
| | BI3 | 0.800 | | | |
| Medical service satisfaction | MSS1 | 0.745 | 0.576 | 0.890 | 0.889 |
| | MSS2 | 0.839 | | | |
| | MSS3 | 0.705 | | | |
| | MSS4 | 0.723 | | | |
| | MSS5 | 0.791 | | | |
| | MSS6 | 0.742 | | | |
| Use Behavior | UB1 | 0.768 | 0.609 | 0.861 | 0.860 |
| | UB2 | 0.823 | | | |
| | UB3 | 0.758 | | | |
| | UB4 | 0.769 | | | |

| | PE | EE | SI | FC | TA | SE | BI | MSS | UB |
|---|---|---|---|---|---|---|---|---|---|
| PE | 0.774 | | | | | | | | |
| EE | 0.272*** | 0.792 | | | | | | | |
| SI | 0.346*** | 0.156** | 0.762 | | | | | | |
| FC | 0.203*** | 0.229*** | 0.226*** | 0.782 | | | | | |
| TA | 0.408*** | 0.317*** | 0.288*** | 0.244*** | 0.770 | | | | |
| SE | 0.304*** | 0.269*** | 0.363*** | 0.197*** | 0.300*** | 0.796 | | | |
| BI | 0.471*** | 0.398*** | 0.411*** | 0.227*** | 0.429*** | 0.488*** | 0.797 | | |
| MSS | 0.320*** | 0.436*** | 0.261*** | 0.240*** | 0.180** | 0.333*** | 0.180** | 0.759 | |
| UB | 0.277*** | 0.393*** | 0.338*** | 0.267*** | 0.267*** | 0.375*** | 0.267*** | 0.441*** | 0.780 |

| Hypothesis | Path | B | t- Statistics | P | Comments |
|---|---|---|---|---|---|
| H1 | SE->EE | 0.292 | 4.993 | *** | Supported |
| H2 | PE->BI | 0.189 | 3.244 | 0.001 | Supported |
| H3 | EE->BI | 0.156 | 3.127 | 0.002 | Supported |
| H4 | SI->BI | 0.161 | 2.89 | 0.004 | Supported |
| H5 | FC->BI | 0.009 | 0.189 | 0.85 | Not supported |
| H6 | TA->BI | 0.169 | 3.09 | 0.002 | Supported |
| H7 | SE->BI | 0.247 | 4.185 | *** | Supported |
| H8 | MSS->BI | 0.175 | 3.282 | 0.001 | Supported |
| H9 | BI->UB | 0.486 | 8.065 | *** | Supported |

The results show that the paths include SE--->EE (t = 4.993, β = 0.292, P<0.05), PE--->BI (t = 3.244, β = 0.189, P<0.05), EE--->BI(T=3.127, β=0.156, P<0.05), SI-->BI(t=2.89, β = 0.161, P<0.05), TA->BI(t = 3.09, β = 0.169, P<0.05), SE->BI (t = 4.185, β = 0.247, P<0.05), MSS->BI (t = 3.282, β = 0.175, P<0.05), BI->UB (t = 8.065, β = 0.486, P<0.05) are significant, so H1, H2, H3, H4, H6, H7, H8, H9 were supported. However, the path of FC->BI (t = 0.189, β = 0.009, P>0.05) is not significant, so H5 was not supported in this study.

## Conclusion & Future Research

This study explored the factors influencing older adults' behavioural intention to use SPSS through the UTAUT model. The findings indicated that PE, EE, SI, SE, MSS significantly positively affected older adults' behavioural intention. TA significantly negatively affected older adults' behavioural intention to use SPSS. In contrast, convenience had no significant effect on behavioural intention.
This study provides recommendations for developers and encourages them to improve and develop SPSS in line with the recommendations to enhance the user experience of older people and promote their use of the technology.

**Future research:** Firstly, the data collection for this study was conducted on the Internet. From a data integrity perspective, it should also include older people with barriers to using mobile electronic devices.
Secondly, this study only used quantitative research, making it difficult to explain older people's actual use of technology. Future research should use mixed methods to explore the perceptions of older people further.