Designing Health Intervention Through Social Media and VR as Incentives for the Elderly with Frailty

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Abstract
Taiwan has become an aged society in 2018 and is expected to be a super-aged society nine years later when Taiwanese over 65 will account for over 20 percent of its population. In view of the fact that Taiwan's frail elderly will increase substantially in ten years, this study applies theories of disengagement and continuity of the elderly to conduct an experiment by designing virtual reality activities through social media platform for health intervention. Through the design of social marketing and VR as incentives of health communication, this study invites elder people with frailty or mild disability and their care helpers to participate VR experience by using VR Box. The results show that trust, self-confidence, and security observation are related to whether they are willing to accept VR experience and enjoy it.

Keywords: healthy aging, social marketing, VR, independence index for the elderly, health campaign

Introduction

Innovative applications of sharing economy services have the potential to support a population aging in place through technology-enabled platforms to support older adults and their caregivers (Miller, et al. 2018). New technology promises to enable a transformation in the delivery of care, putting patients at the center of care systems that engage and empower them by connecting patients to caregivers (Coughlin, et al. 2006). In Coughlin's intelligent devices and appliances models, older adults can be monitored, managed, and motivated for their health goals as follows: monitoring of reduction emergency events and rapid intervention to health changes to improve efficacy; management through using remote embedded risk models to increase access patient's progress; motivation enhancement by displaying technologies to offer two-way communications for integration of fun and familiar entertainment systems which can coach and connect patients, caregivers and their family (See Table 1).

Table 1. An Integrated Approach to Technology Use in Home Health Care and Disease-Management Services

	Function	*Technologies*	*Innovation and Outcomes*
Monitor	24/7 monitoring of health and activities	Intelligent devices and appliances, Internet-enabled services, predictive behavior models, and so on	Reduction of emergency events, rapid intervention to health changes and/or decline
Manage	Identify and prioritize patients requiring remote or home-based intervention	Information technology and software with embedded risk models to triage, review, and assess patient progress	Efficient use of home health care human and financial resources
Motivate	Engage, educate and empower patient and/or family in their own health	Glanceable display technologies, two-way communications, integration of fun and familiar entertainment systems to coach and connect patients, caregivers, families	Management of existing conditions and prevention of disease

SOURCE: MIT AgeLab.

Cited by Coughlin, J.F. Pope, J., Leedle, B. (2006). Age, New Technology, and Future Innovations in Disease Management and Home Health Care. Home Health Care Management & Practice, p.202 / April.

The idea of applying the integrated Approach to Technology Use in Home Health Care and Disease-Management Services, technology use may be applied to elder adults in different locations when the Internet services are more available and mobile, especially with a lower-budget consideration. Alleyne et al. (2013) discuss the approaches to prevent and control no communicable diseases (NCDs) and governments have adopted a goal of 25% reduction in relative mortality from NCDs by 2025 when a strong movement is needed by effective partnerships, and with political support to ensure that NCDs are embedded in the post-2015 human development agenda. This study tries to introduce more social partners to use technology to help motivate the elders by using media content through social media as platform and VR Box as a technology tool for the elders with frailty to motivate them to engage, educate, empower patient and/ or family for their health care. However, the problems are complicated when deal with older adults' condition since their physical and mental states are different and complicated. This study just focuses on the first stage to test whether the elder can accept to use technological tool for motivation and whether they appreciate this process. In the real world, the elder people need help of caretakers and care providers; therefore, this study tests whether both the elder people

and their helpers accept and appreciate VR Box and social media content as a tool of motivation.

Literature Review

Lower risks of diseases and disability, high physical and mental function, and engagement with life are three elements of successful aging. However, there are nine-year differences between life expectancy and healthy life expectancy and that means a Taiwanese is predicted to have an average 9-year unhealthy life (See Table 1).

Table 1: Life expectancy vs. healthy life expectancy by nations

Nation	Life expectancy (year)	Healthy life expectancy (year)	Differences
Taiwan	80	71	9
Japan	84	75	9
Korea	82	73	9
Canada	82	72	10
Denmark	80	70	10
France	82	72	10
Germany	81	71	10
Ireland	81	71	10
Australia	83	73	10
New Zealand	82	72	10
Finland	81	71	10
Hungary	81	71	10
Spain	83	73	10
Sweden	82	72	10
UK	81	71	10
USA	79	69	10
Norway	82	71	11
Average (Global)	71	62	9

Data collected from Health Promotion Administration (HPA), Taiwan
https://www.hpa.gov.tw/Pages/List.aspx?nodeid=331

Health Promotion Administration (HPA) and the Department of Nursing and Health Care in Taiwan are responsible to prevent frailty and delay disability for the elderly. The health condition of the elderly is divided into three categories: healthy, sub-healthy, and disability. Although the category of sub-healthy is non-disabled, the physiological status and life assessment functions have gradually emerged and frailty appears which can be measured by SOF or IADL. Therefore, in the past, public funded courses designed for frailty prevention and disability prevention or reduction, not many elder target (over 65 and also frail or disabled) to participate in courses related to frailty. Therefore, for courses organized by government in Taiwan to prevent frailty and disabilities welcome the elderly to participate these courses as long

as they are over 65. Whether the elderly is healthy, sub-healthy or mildly disabled, they are all welcome to participate these classes. The aim is to promote the empowerment of the elderly and help build friendly environment for them by removing barriers for them to participate community activities. Taiwanese government has push the policy of *Towards Age-friendly Primary Health Care* project to encourage family members to participate and develop healthy community projects (See Table 2).

Table 2. Prevention of Frailty for the Elderly and Task Division

Categories	Healthy	Sub-Healthy			Disable		
Able or not	Not-Disable	Not-Disable			Mild	Moderate	Severe
Assessment of ADI/IADL	-				ADL^{+}	ADL^{++}	ADL^{+++}
	-	IADL-	IADL-	$IADL^{+}$	$IADL^{++}$	$IADL^{++}$	$IADL^{+++}$
Assessment of Frailty (SOF)	Robust	Frailty: SOF ≧ 1(+)	Frailty: SOF ≧ 2(+)	Frailty: SOF ≧ 2(+)	Frailty: SOF ≧ 2(+)	Frailty: SOF ≧ 2(+)	Frailty: SOF ≧ 2(+)
Treatment and rehabilitation	Health Promo-tion	•Disability Prevention • Health Promotion • Health Restoration	•Disability Prevention • Health Promotion • Health Restoration		•Disability Reduction • Health Restoration • Health Maintenance • Life function Maintenance		
Division of work	Health Promotion Administration (HPA)	Department of Nursing and Health Care					

*ADL: Activities of Daily Living; **IADL: Instrumental Activities of Daily Living
Data collected from Health Center promotes elderly care services,
Health Promotion Administration (HPA), Taiwan, retrieved from
https://www.hpa.gov.tw/Pages/List.aspx?nodeid=331

To improve health outcomes, U.S. government helps patients to be more engaged in prevention, decision-making, and self-management (ODPHP). The Health Literate Care Model is offered as an important tool to teach health literacy principles. This study focuses on using new technology to motivate the elderly (ODPHP) to produce the elderly' friendly environment as a motivation to help self-independence for leisure and recreation. Social marketing strategies are applied (Weinreich, 1999), traditional 4Ps as product, price, place, promotion are replaced by new 4Ps: publics, partnership, policy and pursestrings. After reviewing the target public as the frail elderly and the policy related to this issue, how partnership can help solve problems of pursestrings is

discussed. Since there are many good content shared in social media and many cheaper technological devices available with free or low prices, this study chose social media and VR Box as tools to push social marketing. This study argues that media content through social media as platform and VR Box as technology for the elders with frailty should be useful to motivate the elderly to engage, educate, empower patient and/ or family for their health care. However, the problem is whether the use of technology is friendly enough for them. VR Box with an advantage of a low price as glanceable display technologies. Social media as YouTube as a two-way communication with a cheaper entertainment system which can integrate smartphones and VR Box into fun and familiar entertainment for coaching and connecting patients, caregivers, and family. Disengagement theory (Cumming and Henry, 1961) and continuity theory (Atchley, 1971) are applied here to explain the elderly's leisure participation and health intervention. Identity continuity theory is applicable in explaining the relationship between retirement and leisure participation. The latter explains how the elderly might withdraw from society inevitably and the process is influenced by the individual ego changes or organizational imperatives.

The purpose of using this intervention approach is to help prevent possible problems about dementia. Dementia is a combination of symptoms which related failing cognitive functions, including loss of memory, space orientation, capability of computing, judgment, abstract thinking, attention, or languages. In addition, degradation or impact of function may cause disturbances, personality changes, delusions or hallucinations may affect their interpersonal relationship and work ability (Veterans Affairs Council). Professionals suggest dementia patients try to stay in familiar environment and keep regular work, maintain the patient's independent life, discover the ability to retain, guide participation in life affairs, maintain patients' dignity and value, and ask for understanding of relatives and friends and appropriate communication to avoid conflict, pay attention to safety and prevent accidents (TADA). The elders with dementia may become more passive and need to motivate and induce to participate in their daily activities and their hobbies. Applying VR Box with YouTube content may be a technological tool for motivation induction. Chen (2018) analyzes how to use reinforcement factors to strengthen the elderly to participate local activities: happy experience, family support, accompanying partners, interactive motivation (activity design), platform/system design, non-expert language used in activities, higher level of needs in Maslow's model, a sense of belonging.

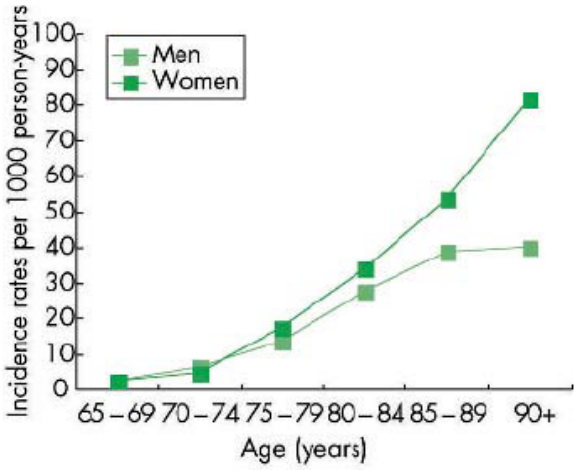

Figure. 1 Pooled incidence rates of dementia by sex. Based on Fratiglioni et al. cited by, retrieved online https://www.researchgate.net/publication/7476462_Epidemiology_and_risk_factors_of_dementia

Research Questions:

1. Whether the elder and their care takers/ providers accept invitation to watch VR Box videos?
2. What are the factors to influence whether they appreciate this tool?

Methodology:

Field experiments have the following characteristics: more realistic situation, extrinsic validity, suitable for studying complex social and psychological processes, influences, and changes in real-life situations; in contrast, it might be problematic to control independent variables (Huang, 2000) Field experimentation represents a departure from laboratory experimentation and attempts to simulate as closely as possible the conditions under which a causal process occurs; its aim is to enhance the external validity, or generalizability, of experimental findings (Alan, 2011). Alan explains that it is common to ask whether the stimulus used in the study resembles the stimuli of interest in the real world, whether the participants resemble the actors who are ordinarily confronted with these stimuli, whether the outcome measures resemble the actual outcomes of theoretical or practical interest, and whether the context within which actors operate resembles the context of interest when he applies a field experiment to the field of politics to evaluate the external validity of an experiments. Field experiment is applied in this study by inviting five pairs of the elderly and their caretakers or care providers to watch VR Box videos. The five pairs are tested in their natural settings such as their living room, their front yard, parks in their neighbor and their working location. Five elders with different stages of frailty or relatively mild disable. These 10 persons are asked to try to put on VR Box with YouTube content shown through a smart phone set in this VR Box. The independent variables are familiarity with the person who presents a VR Box to them, cognitive capability, physical condition (security observation).

Findings:

The results are shown in Table 3. The first elder tester's condition is more toward disengaged condition. The second elder tester has been ill for a month, is still waiting for going back to work and is trying to stay in continuity condition. The third case is physically disable and hard to be mobile but tried to go back to continuity state. The fourth elder is almost totally disabled and counts on his caretaker a lot. The fifth elder is toward frailty physically but mentally healthy but totally refused to try VR Box. Research question 1 is about whether they will accept to try a VR Box. The results are listed below. Only one elder and one caretakers show that they enjoy using VR Box a lot. 2nd elder, with high cognition shows that she is eager to go back to work and shows less interest to use them but had tried all three videos. The elder in pair3 is with high cognition but with low dominance to mobile and he only watched one 3d video but shows only limited interest in it. In pair 4, the caretaker refuse to try by saying that her eyes have problems and the elder she taking care did not try. In pair 5, the tester is walkable elder lady with sighs of being frailty and she refuses right away (See Table 3). The answer of Research question 1 is that those who are familiar with the one who is familiar with them are more likely to try. For Research question 2, Testers with better physical or cognitive conditions are more likely to try VR Box but in general they are not really into it. In general, the results show that familiarity which is explained by trust in this study and self-confidence which is explained by the cognitive issue and the physical issue are related to whether they are willing to accept VR experience and enjoy it.

Table 3: Results of in 5 pair testers by dependent and independent Variables:

Depen-dent Variables: Accept to watch or not	Pair1 (Code M)		Pair (Code N)		Pai3 (Code R)		Pair4 (Code E)		Pair5 (Code P)	
	elder	helper	elder	helper	elder	helper	elder	helper	elder	helper
360 video	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes
4k video	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes
3d video	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Indepen-dent Variables										
Familiar-ity	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Physical issue	No	No	Yes	No	Yes	No	Yes	No	No	No
Cognitive issue	Yes	No	No	No	No	No	Yes	No	No	No

Discussion:

This study tests whether a VR appliance could be accepted as a tool for health intervention designed for the elderly. VR Box and social media content are used. Although leisure experience of VR Box is immersive, the elderly responses are not quite well and only accept to try it when they have better physical condition to cope with the issue of safety environment, trust, and better cognitive issue. Future studies can design VR, AR or MR content that reflect the elderly's needs or production of friendly environment for the elderly. Except mental disorders, other designs can target NCDs four main diseases (diabetes, cardiovascular diseases, cancers and chronic respiratory diseases) and four common risk factors (tobacco use, unhealthy diet, physical inactivity, and unhealthy use of alcohol for possible future health intervention.

References

Alan. G., Green, D. (2011), Field Experiments and Natural Experiments, The Oxford Handbook of Political Science, Edited by Robert E. Goodin

Atchley, R. C. (1971). Retirement and leisure participation: Continuity or crisis? The Gerontologist, 11, 13-17.

Chen, Y. (2019). Exploring the Efficacy of Independence Index for Healthy Aging for the Services of Elders, The Asian Conference on Aging & Gerontology 2018 Official Conference Proceedings

Chiu, M. & Fu, H. (2014). Probing into Seniors' Experiences of Community Care Centers –A Study on the Guandu Care Center Case. Journal of Community Work and Community Studies. Vol.4, No.1, 1-40,

Chou, M., Liang, C., Chou, S., Lu, Y., Hsueh, K., Tu, M. (2011). Cognitive Impairment among Elderly Residents in the Long Term Care Facilities in Southern Taiwan. Taiwan Geriatr Gerontol 6(1): 43-51

Coughlin, J.F. Pope, J., Leedle, B. (2006). Age, New Technology, and Future Innovations in Disease Management and Home Health Care. Home Health Care Management & Practice / April

Cumming E. and Henry W. (1961). Growing Old: The Process of Disengagement. New York: Basic Books.

Alleyne, G., Binagwaho, A., Haines, A., Jahan, S., Nugent, R., Rojhani, A., & Stuckler, D. (2013). Embedding non-communicable diseases in the post-2015 development agenda. The Lancet, 381(9866), 566-574. https://doi.org/10.1016/S0140-6736(12)61806-6

Non-Communicable Diseases, NON-COMMUNICABLE DISEASES / FEB 2016, retrieved from https://www.sida.se/contentassets/307665a2ec474c0da415e6c70fc33411/18566.pdf.

Flier, W. (2006). Epidemiology and risk factors of dementia, Journal of Neurology Neurosurgery & Psychiatry. 76 Suppl 5: v2-7

Miller, J., Ward, C., Lee, D'Ambrosio, L. & Coughlin, J. (2018) Sharing is caring: The potential of the sharing economy to support aging in place, Gerontology & Geriatrics Education

TADA, 陳達夫，認識失智症，http://www.tada2002.org.tw/ (台灣失智症協會) Veterans Affairs Council, https://www.vac.gov.tw/mp-1.html 認知障礙---漫談失智症衛生所推動高齡友善照護服務 - 衛生福利部國民健康署。

Huang, G. (2000). Field experimentation, 教育大叢書. Retrieved from http://terms.naer.edu.tw/detail/1313026/

Health Literate Care Model, from ODPHP.
https://www.hpa.gov.tw/Pages/List.aspx?nodeid=331
Retrieved from https://health.gov/communication/interactiveHLCM/

Raphael, D., Brown, I., Renwick, R., Cava, M., Weir, N., Heathcote, K. (1995). The quality of life of seniors living in the community: a conceptualization with implications for public health practice. *Canadian Journal of Public Health. 86(4):228-233.*

Rowe, J. W., & Kahn, R. L. (1997). Successful aging. Gerontologist, 37, 433-440.
Weinreich, N. (1999). Hands-On Social Marketing: A Step-by-Step Guide to Designing Change for Good, CA: SAGE Publications

Wen, J., Ko, M., Chen, C. (2015). Utilization of Psychiatric Services for the Elderly in Taiwan: A Health Claims Data Analysis. *Taiwan Geriatr Gerontol. 10(1): 28-41*