Ten Years’ Tracking and Data of Television Usage of an Older Female Living Alone

Kazuki Nakajima*, #

Abstract

Watching television (TV) is a popular leisure activity for older people and its usage is almost constant in the rhythm of their daily life. A telemonitoring system of television-operating-state for older people living alone has been developed, and an older female living alone has been using this system for 10 years. On her working days, the average TV usage was 192 min per day in the first year, increasing year by year to 329 min per day 10 years later. TV usage temporarily increased when some TV programs took up a social topic of interest to her.

Keywords: television usage, older living alone, telemonitoring, 10 years’ tracking.

Adv Biomed Eng. 10: pp. 32–35, 2021.

1. Introduction

The number of older people living alone is increasing in Japan’s aging society [1]. A survey of telemedicine in developed countries in Europe reported that 98% of nearly ten thousand older persons watched television (TV) routinely [2]. A survey in Germany found that 4,800 housewives aged 50 years or older watched TV for almost four hours a day [3]. Another survey of older women in the US reported that they spent about four hours watching TV and that the most popular programs were news [4]. It can be concluded that watching TV is a popular leisure activity for older people in developed countries.

A telemonitoring system of television-operating-state (TVOS) for older people living alone has been developed [5] and some experiments were conducted for system verification. Although the system is not intended to handle an emergency situation, the results of TVOS reflect the participants’ daily activities individually and TV usage was almost constant in their life rhythm [5–8]. The system does not specifically describe the health condition of an elderly parent living alone, but if that individual’s family is familiar with the parent’s viewing habits, they would be able to identify any change that might indicate a need for assistance. The results of several feasibility studies of how this system can help estimate the living conditions of remote families have been reported [5–8], and 88% of subjects said that monitoring TVOS using this system could estimate the living conditions of their families in remote areas [7].

In this paper, 10 years’ TVOS recording of an older female living alone was achieved and the data was analyzed. Although it was the result of one subject, the purpose of this paper is to discuss how TVOS reflects her living conditions and what is the important point to achieve continuous recording for a long period.

2. Methods

2.1 Subject and monitoring period

A 65-year-old female participated in this study in 2008. She has lived alone in city X of Japan and led an independent life without receiving any care services. She has been an administrative scrivener and has managed her office, which was located 1.9 km from her home, every Monday through Friday, except on holidays. She attended fitness clubs 3–4 times a week from April 2010 to December 2014 to maintain her health. After leaving the fitness club, she exercises or walks once a week for 30 min on off days.

She had two TV sets in her home. One was in her bedroom and the other was in the guest room. The telemonitoring system of TVOS [5] was installed in the bedroom as she never used the TV alone in the guest room. She enjoyed watching TV in the bedroom every day and watched several TV news programs, soap operas, and music programs, either live on air or recorded. She usually watched TV after dinner until she slept. A family

Received on September 8, 2020; revised on December 27, 2020 and January 28, 2021; accepted on February 2, 2021.

*Division of Bio-information Engineering, University of Toyama, Toyama, Japan.
#3190 Gofuku, Toyama 930–8555, Japan.
E-mail: kazukin@eng.u-toyama.ac.jp

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member living apart who was monitoring the TVOS called every week to check her living conditions. The family member copied the data from the monitoring PC and gave it to the author every March. After performing TVOS analyses in December 2018, the subject was asked about her activities during the period that showed a temporal increase in time spent watching TV.

TVOS monitoring started on March 14, 2008. A lack of TVOS data occurred for three reasons: (1) antivirus software detected viruses, (2) Microsoft Windows update, and (3) the PC shut down due to an electric power failure. When the PC stopped for the above reasons, the family member called the subject and asked her to restart the PC. In this study, TVOS data was analyzed for the period from April 1, 2008, to February 28, 2018. The average outside temperature of city X was obtained from the database of the Japan Meteorological Agency.

2.2 Telemonitoring system of TVOS

Figure 1 shows a schematic illustration of the telemonitoring system of TVOS. A current sensor (CTL-6-L, U_RD, Japan) is installed on the TV power line and outputs a voltage signal when current passes through the TV power line. The detected signal is amplified, rectified, and compared to a threshold voltage, and the TVOS signal is stored on a PC in the older person’s house. The PC is connected to the Internet and transfers the TVOS data by e-mail with a timestamp to a monitoring computer at the family’s end in real time. Details of the sensor devices and the procedure of data transfer are described previously [6, 7].

2.3 Ethics

The research design of this study was approved by the ethics committee of the University of Toyama. Written informed consent was obtained from the subject before the monitoring was conducted.

3. Results

The subject rarely forgot to turn off the TV. Therefore, daily TV usage was averaged for each month. Figure 2 shows the average daily TV usage for each month and the outside air temperature for 10 years. If the data was recorded more than 14 days a month, plots were displayed in Fig. 2. The average TV usage was 192 min per day in the first 12 months, and increased incrementally year by year, reaching 329 min per day in the last 12 months. Horizontal dotted lines in Fig. 2 show the average TV usage for the first and last 12 months. The average TV usage increased by 137 min per day in 10 years. Since January 2015, TV usage increased stepwise by approximately one hour per day. According to the interview, she began watching an hour-long news program in the morning of her working days from January 2015. In city X, the average outside air temperature changes from about 5°C to about 30°C resembling a sinusoidal wave (Fig. 2).

Figure 3 shows TV usage of working and off days for 10 years. TV usage was averaged every 3 months by the number of days the TVOS data was available to provide a clear trend line. The dots and bars in Fig. 3 indicate the mean and standard deviation of TV usage. TV usage on off days was approximately one hour longer than that on working days. In the first and second quarter...
of 2011, and the first quarter of 2017, TV usage on off days was transiently two hours longer than the working days. According to the interview, she was most interested in the social impact of the Great East Japan Earthquake that occurred on March 11, 2011. Moreover, she had a keen interest in who would be elected in the US presidential election and what would happen after that in the first quarter of 2017.

4. Discussion

Since many people are affected by diseases with aging, various monitoring devices for healthcare have been developed [9–11]. However, many of them are wearable devices or they require the active cooperation of the subject for monitoring. For healthcare, it is important to monitor activity or health conditions over a long period. For long-term monitoring of activities or health condition, subjects must maintain a strong motivation and have the will to actively cooperate with measurement. Otherwise, the monitoring method should require no cooperation from the subject. In this study, the subject just used the TV without any cooperation for TVOS monitoring, and monitoring was achieved for 10 years. It should be emphasized that measurement without the effort on the part of the subject is significant for long-term monitoring. TVOS is suitable for long-term monitoring of older people’s activity.

A study reported that an increase in TV usage reflected a decrease in steps walked as measured by a pedometer [5]. In this study, TV viewing time and outside air temperature seem to be inversely correlated (Fig. 2). Although it may not be common, TV usage increased on off days in this subject. When there were topics of great interest to the subject, such as the Great East Japan Earthquake and the US presidential election, TV usage also increased due to the eagerness of acquiring information. Besides, according to the tracking of ten years, daily TV usage increased by approximately two hours over ten years.

Reports have shown that older people nowadays use TV every day [2–5]. The TVOS monitoring system is suitable for long-term monitoring of the older person’s activity. However, young people these days often do not have a TV set and watch videos on their mobile devices or PCs via the Internet as their leisure activity. Therefore, another activity monitoring method may be necessary for the next generation when today’s youth becomes significantly older.

5. Conclusion

TV usage of an older female living alone was monitored over 10 years and analyzed in this study. In this subject, TV usage increased on off days, and also increased by approximately two hours per day over 10 years. Transiently increased TV usage was recorded when the subject was eager to obtain information from TV programs.

Acknowledgement

The author deeply appreciates Dr. Sasaki K and Dr. Kim J for their fruitful discussions. Thanks are also extended to Mr. Fuji S, Mr. Kawamura T, Mr. Kamiya A, Mr. Matsui H, Mr. Motoya T, Mr. Tagawa T, Mr. Kakikawa T, Mr. Kamaya N, Mr. Wakino T, Mr. Naito S, Ms. Funane R, and Mr. Hayashi M for their many technical cooperations. The author is also grateful to Ms. Hosokawa T for her help in preparing the manuscript. This work was partly supported by JSPS KAKENHI Grant Number JP17510121, JP19510143, and JP22500501.

Conflicts of interest

The author declares no conflicts of interest with any companies or commercial organizations per the definition of Japanese Society for Medical and Biological Engineering.

References

1. Cabinet Office, Government of Japan: White paper 2018. <https://www8.cao.go.jp/kourei/whitepaper/w-2018/html/>
2. Stroetmann VN, Husing T, Kubitschke L, Stroetmann KA: The attitudes, expectations and needs of elderly people in relation to e-health applications: results from a European survey. J Telemed Telecare. 8(Suppl 2), 82–84, 2002.

3. Grajczyk A, Zollner O: How older people watch television - Telemetric data on the TV use in Germany in 1996-. Gerontology. 44(3), 176–181, 1998.

4. Fogel J, Carlson MC: Soap operas and talk shows on television are associated with poorer cognition in older women. Southern Med J. 99(3), 226–233, 2006.

5. Nakajima K, Kamiya A, Matsui H, Oikawa D, Fujita K, Higashi Y, Tamura T, Fujimoto T, Sasaki K: Development of a television-use telemonitoring system for elderly daycare-recipients living alone. J Robotics Mechatronics. 19(6), 683–690, 2007.

6. Matsui H, Nakajima K, Sasaki K: Development of telemonitoring system to monitor television’s operating state between families. Trans Jpn Soc Med Biol Eng. 46(1), 117–125, 2008. Abstract in English.

7. Motoya T, Nakajima K, Suenaga T, Sasaki K: E-mail-based telemonitoring network system to evaluate living condition in family members. Trans Jpn Soc Med Biol Eng. 47(4), 345–358, 2009. Abstract in English.

8. Kamaya N, Kakikawa T, Kim J, Nakajima K: Development of a wireless sensing system for monitoring television and indoor lighting use by the elderly. Trans Soc Instr Control Eng. 50(2), 185–187, 2014. Abstract in English.

9. Tamura T, Chen W: Seamless monitoring of physiological information in daily life: Retrospectives and perspectives. Adv Biomed Eng. 4, 86–95, 2015.

10. Yuasa Y, Suzuki K: Wearable device for monitoring respiratory phases based on breathing sound and chest movement. Adv Biomed Eng. 8, 85–91, 2019.

11. Yamashita K, Yamashita T, Sato M, Inoue M, Takase Y: The effects of an 18-month walking habit intervention on reducing the medical costs of diabetes, hypertension, and hyperlipidemia—A prospective study. Adv Biomed Eng. 9, 117–124, 2020.

Kazuki NAKAJIMA

Kazuki NAKAJIMA is a professor in faculty of engineering, University of Toyama. He received the B.E. and the M.E. degrees from Kyoto Institute of Technology in 1985 and 1987, respectively. He also received the Ph.D. degree from Yamaguchi University in 1996. He has served as a research associate in Yamaguchi University from 1988. From 1999, he has served as a chief, Laboratory for Development of Equipment for Nursing and Personal Care, Department of Gerontechnology, National Institute for Longevity Sciences. He has served as an associate professor in University of Toyama from 2003. His research and educational activities focused on development of methods for measuring biomedical information and development of welfare devices for the elderly. He is a member of the IEEE, the JSMBE, the SICE, and the society of life support engineering.