Different experiences on the analysis of occupational performance with wearables devices

María del Carmen Miranda-Duro[1,2]*, Patricia Concheiro-Moscoso[1,2], Betania Groba[1,2], Laura Nieto-Riveiro[1,2] and Nereida Canosa[1,2]

[1]Faculty of Health Sciences, Oza Campus, University of A Coruna, 15071 A Coruña, Spain;
[2]CITIC (Centre for Information and Communications Technology Research), TALIONIS Group, Elviña Campus, University of A Coruna, 15071 A Coruña, Spain.
*Author to whom correspondence should be addressed: carmen.miranda@udc.es.
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Abstract

The present paper presents a set of experiences with the use of Xiaomi Mi Band (from version 1 to 5) in different populations but with the purpose of monitoring the daily life and the occupational performance of the participants. Monitoring with wearable sensors is an easy and non-intrusive approach to encourage preventive care by occupational therapists or other health providers to facilitate professional practice.

1 Introduction

The use of wearable devices is becoming increasingly common. The market is growing, and more and more people are making use of them. In this line, there has also been an increase in research that uses them for different purposes, including health perspective. The research group has developed studies with different populations to analyze the day-to-day life of the participants (GlobalData, 2019).

In this line, the review of Marston H, Hadley R, Banks D and Miranda-Duro MC (2019) demonstrates positive trends to using mobile devices across different environmental settings and populations. Thus, the need to identify alternative solutions to facilitate and ensure primary care providers can deliver cost-effective health care, for both the service provider and the user.

The aim of the present study is to show the usefulness of wearable devices for analyzing occupational performance in different populations. It is important to emphasize that the aim is not to have exact data from these devices, but rather data that is close to reality and helps us to understand what people's day-to-day lives are like from a health point of view.

2 Summary of experiences with Xiaomi Mi Band

The first experiences with Xiaomi Mi Band were pilot studies through the projects Cloudpatient (www.cloudpatient.udc.es) and Geriatic (www.geriatic.udc.es). In these studies, some older adults wear the band during a period to understand their daily life, analyzing mainly the daily steps and sleep (Nieto-Riveiro et al, 2018). In the first experiences, data had to be extracted manually into Excel documents to analyze the data. In the following experiences, the researchers could use the app of Xiaomi Mi Band to automatically extract the data.

The study of Miranda-Duro, M., Nieto-Riveiro, L., Concheiro-Moscoso, P., Groba, B., Pousada, T., Canosa, N., & Pereira, J. (2021) explores the relationship between the daily activity measured by Xiaomi Mi Band 2 and the risk of falling of older adults residing in or attending care facilities. The main findings obtained were that a greater number of steps and distance could be related to a lower probability of falling, of dependency in basic activities of daily living, or of mobility problems.

The study of Concheiro-Moscoso, P., Groba, B., Martínez-Martínez, F. J., Miranda-Duro, M. del C., Nieto-Riveiro, L., Pousada, T., & Pereira, J. (2022) reflects an analysis about the influence of sleep and its changes concerning the health status and daily activity of older people who lived in a nursing home, by monitoring the participants for a year with Xiaomi Mi Band 2. The main outcomes were that sleep may influence daily activity, cognitive state, quality of life, and level of dependence in activities of daily life.

Similar studies were carried out in mental health population with the use of Xiaomi Mi Band 5. The first was designed to investigate about stress as Concheiro-Moscoso, P., Groba, B., Martínez-Martínez, F. J., Miranda-Duro, M. del C., Nieto-Riveiro, L., Pousada, T., Queirós, C., & Pereira, J. (2021) study that was carried in Spain and Portugal with works of universities or research centers, with the purpose of finding out if the wearables are devices capable of determining the level of labor stress of working people in a research center. The other project that has been initiated is focused on people with mental health disorders to study the influence of green spaces in mental health and the occupational performance.

After having experience with the use of the Xiaomi Mi Band, in parallel, it was proposed to validate the sleep data, as inconsistencies were observed in the records of the wristband. (Concheiro-Moscoso, P., Martínez-Martínez, F. J., Miranda-Duro, M. del C., Pousada, T., Nieto-Riveiro, L., Groba, B., Mejuto-Muiño, F. J., & Pereira, J., 2021).

3 Conclusions

The main conclusion is that wearable devices can be an affordable, convenient, and intuitive alternative to include in the assessment and intervention of occupational therapists, within interdisciplinary and multifactorial programs, to promote quality of life and occupational participation. Wearable devices continuously monitor the person, which may help to understand their needs.

Wearable devices are becoming an assessment tool for evaluating physical activity and sleep, among other biomedical parameters. The importance of focusing on daily steps, sleep, or other parameters, is that is an objective assessment that makes it easy for the professional to view several days of registration, compared to traditional assessments using tools that evaluate a specific moment on a specific day, not obtaining representative and real data of the person.

Also, the use of the mobile app, to visualize Xiaomi monitoring data, facilitates to visualize these data obtained in a more visual way that is generated automatically in real time even without the need to be in person with the participant. By viewing the data in the app, you can observe the occupational patterns, routines, and roles of the participants for days, weeks, months or the time that is defined.

Even though these devices can provide benefits, it must be considered that they can record data incorrectly or during monitoring, problems related to the battery or other aspects of the device's operation may arise. All these considering that the Xiaomi mi Band is an economic device and therefore cannot be compared with more sophisticated technological devices such as polysomnography, actigraphy and others.

References

Concheiro-Moscoso, P., Groba, B., Martínez-Martínez, F. J., Miranda-Duro, M. del C., Nieto-Riveiro, L., Pousada, T., & Pereira, J. (2022). Use of the Xiaomi Mi Band for sleep monitoring and its influence on the daily life of older people living in a nursing home. DIGITAL HEALTH. https://doi.org/10.1177/20552076221121162

Concheiro-Moscoso, P., Groba, B., Martínez-Martínez, F. J., Miranda-Duro, M. del C., Nieto-Riveiro, L., Pousada, T., Queirós, C., & Pereira, J. (2021). Study for the Design of a Protocol to Assess the Impact of Stress in the Quality of Life of Workers. International Journal of Environmental Research and Public Health, 18(4), 1413. https://doi.org/10.3390/ijerph18041413

Concheiro-Moscoso, P., Martínez-Martínez, F. J., Miranda-Duro, M. del C., Pousada, T., Nieto-Riveiro, L., Groba, B., Mejuto-Muiño, F. J., & Pereira, J. (2021). Study Protocol on the Validation of the Quality of Sleep Data from Xiaomi Domestic Wristbands. International Journal of Environmental Research and Public Health, 18(3), 1106. https://doi.org/10.3390/ijerph18031106

GlobalData. (2019). Wearable technology in healthcare. Retrieved from: www.globaldata.com

Marston, H. R., Hadley, R., Banks, D., & Duro, M. D. C. M. (2019). Mobile Self-Monitoring ECG Devices to Diagnose Arrhythmia that Coincide with Palpitations: A Scoping Review. Healthcare, 7(3), 96. https://doi.org/10.3390/healthcare7030096

Miranda-Duro, M., Nieto-Riveiro, L., Concheiro-Moscoso, P., Groba, B., Pousada, T., Canosa, N., & Pereira, J. (2021). Analysis of Older Adults in Spanish Care Facilities, Risk of Falling and Daily Activity Using Xiaomi Mi Band 2. Sensors (Basel, Switzerland), 21(10), 3341. https://doi.org/10.3390/s21103341

Nieto-Riveiro, L., Groba, B., Miranda, M. C., Concheiro, P., Pazos, A., Pousada, T., & Pereira, J. (2018). Technologies for participatory medicine and health promotion in the elderly population. Medicine, 97(20), e10791. https://doi.org/10.1097/MD.0000000000010791