

## Brief Report

**Smartphone technology to monitor physical activity among medical students and its association with mental distress**Yasodha Dissanayake<sup>1</sup>, Janith Warnasekara<sup>1\*</sup>, Suneth Agampodi<sup>1</sup><sup>1</sup>Department of Community Medicine, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka.**Abstract**

With the advancement of technology, smartphones have become a widely available tool in day-to-day activities. However, the feasibility of using this technology for monitoring physical activity is not well described. A cross-sectional longitudinal study was conducted among fourth-year medical undergraduates of the Rajarata University of Sri Lanka. Students were invited to install the “Pacer” android app - a smartphone pedometer application - to their smartphones. By using the application, daily footstep counts were recorded by the students for one week. Data were collected from 45 medical undergraduates (26 females, 19 males). The mean daily steps count of participants was 5444 (SD-2132) with a range of 2132 to 12709. None of the participants reached the required daily step count on all tested days. Students residing in their own homes had a lower step count. The students who had distress or anxiety disorders had low step counts compared to the other students.

**Keywords:** Physical activity, Mobile Phones, Mental distress

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**Introduction**

The magical 10,000 steps a day concept, which was originated in Japan and recommended by the World Health Organization, is a realistic goal of introducing physical activity into a hectic workday (1). Physical activity plays an important role in leading a healthy life with reduced risk of cardiovascular diseases, metabolic syndrome, and improvement in mental wellbeing reducing anxiety and stress (2). From the "10,000 step meter" to smartphone technology, new approaches like beneficial and innovative applications in monitoring physical activity have been developed to motivate people to improve physical activity (3). Hand-held smartphones play a significant role in disease surveillance systems,

including infectious disease control (4). It is also considered beneficial in preventing non-communicable diseases over clinical interventions by monitoring personalized physical fitness. Undergraduate medical students may have poorly cultivated exercise habits with the stress of becoming responsible future doctors (5). Our objective was to determine the physical activity among undergraduate medical students using smartphone technology.

**Methods**

Fourth-year medical undergraduates from the Rajarata University of Sri Lanka were invited to install the “Pacer” android app, a smartphone pedometer application, to their smartphones and using the application, they recorded their daily footstep counts for one week. Students were asked to carry their smartphones with them whenever walking. There were no public holidays in the time period and routine clinical training was the main activity students engaged in.

**Results**

Data were collected from 45 medical undergraduates (26 females, 19 males) with a mean age of 22.5 (SD=0.9). The mean daily steps count of participants was 5444 (SD=2132) with a range of 2132 to 12709 (Figure 1)

Although 10,000 footsteps per day are recommended for a healthy human, none of the participants reached the required amount on most days. Only one participant reached the average footsteps of 10,000. There were 12 participants who exceeded 10,000 footsteps at least on a single day. Figure 2 shows the distribution of those 12 students in the study sample.

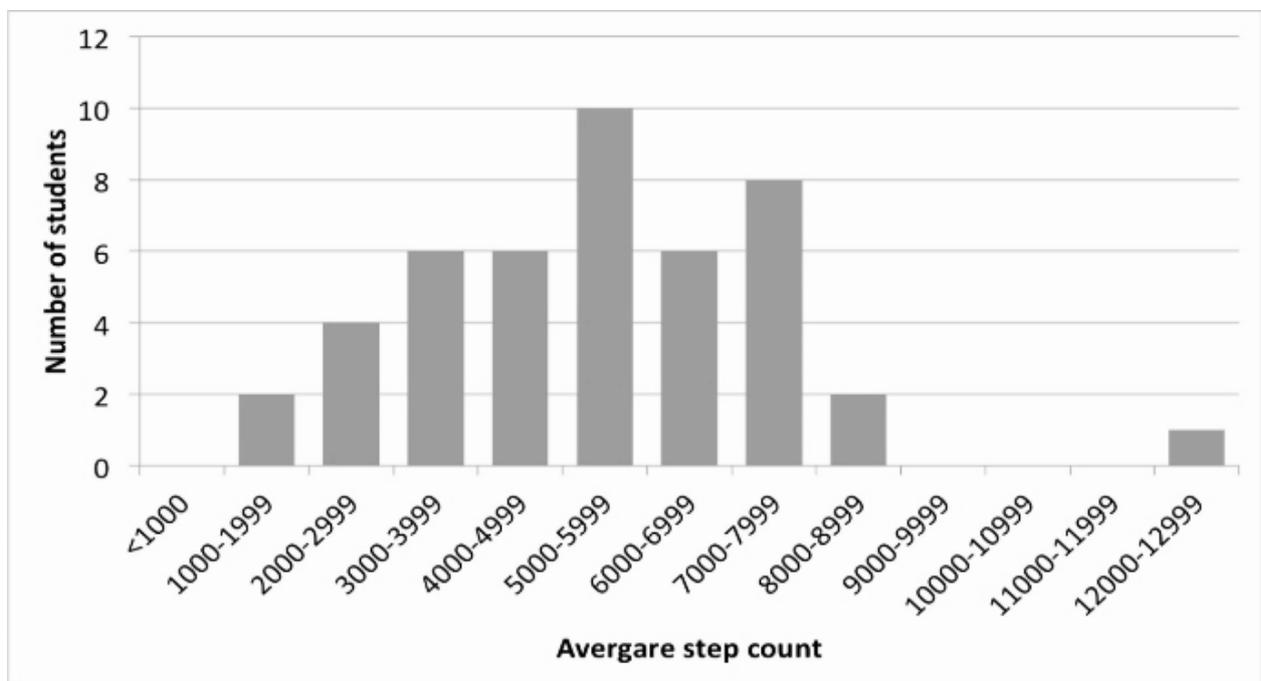


Figure 1 – Average step count of the participants

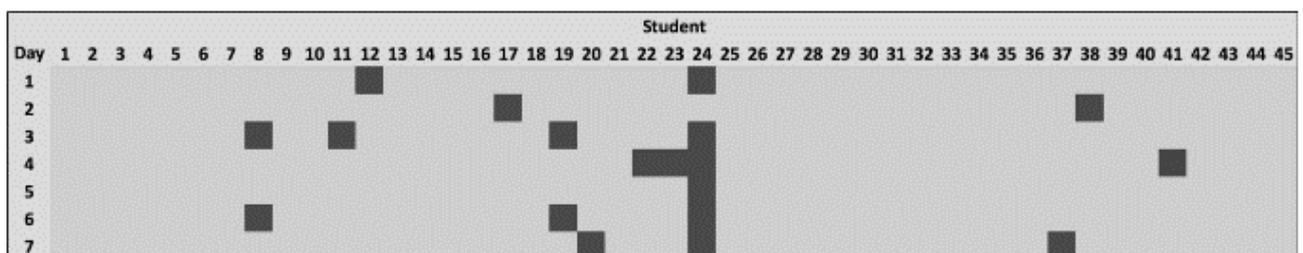
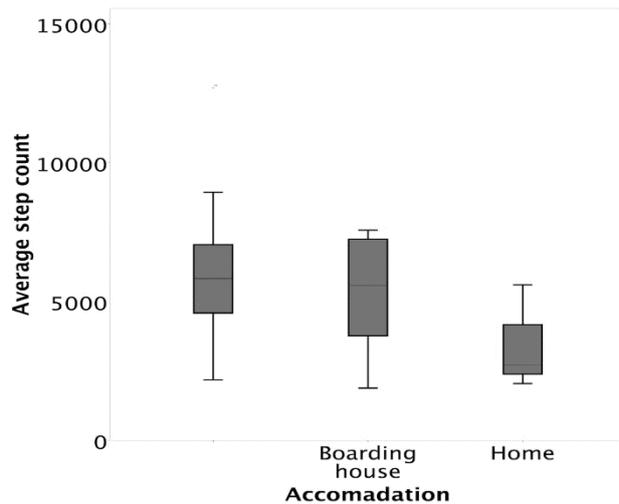


Figure 2 – Distribution of daily footsteps



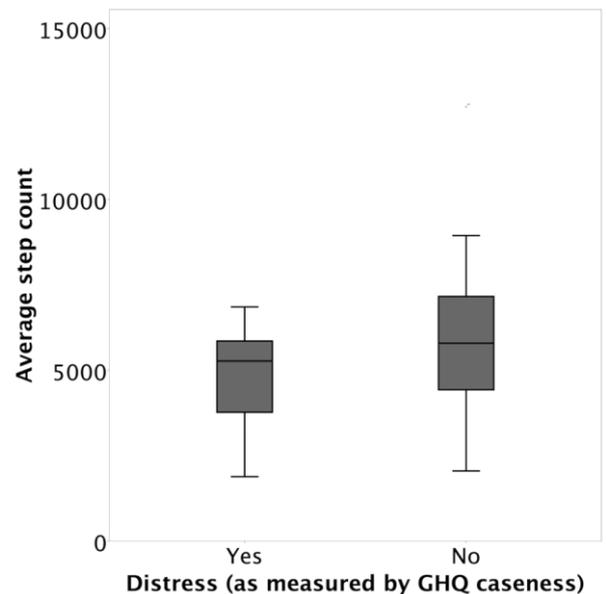
**Figure 3 – Association of Accommodation and step count**

Males had a higher step count, but it was not statistically significant. The number of times a male student achieved the desired count was 12 compared to 8 among female students. Students residing in their homes had a lower average step count (3462) compared to others (5802) (Figure 3).

In addition, we observed that the students with distress and anxiety disorders who were detected by using GHQ 12 and PHQ questionnaires also had fewer step counts. (Figure 4) An increasing trend was observed in physical activities over seven days.

## Discussion

Medical students in this population have a “sedentary lifestyle”. Freely available smartphone technology could be used for physical activity monitoring as an easy and cheap method. Monitoring physical activity itself may improve physical activity among students. Beyond the physical activity monitoring, ubiquity and handiness of smartphone technology make it a feasible method to assess nutritional status and emotional status reducing the financial and spatial burden of clinical interventions in non-communicable disease management (3). A trendy



**Figure 4 – Association of distress level and footsteps**

platform needs to be developed to motivate future doctors to create a behavioral change towards a healthy lifestyle with a reduced risk of non-communicable diseases.

## Limitations

Students were not carrying their mobile phones throughout the day every single time they walked. Therefore, their actual step counts may be higher than what is recorded in the smartphone app.

## Author contributions

All authors were involved in designing, analyzing, and writing the manuscript. YD was involved in data curation.

## Ethical clearance

Ethical clearance for the research was obtained from the Ethics review committee of the Faculty of Medicine, and Allied Sciences, Rajarata University of Sri Lanka.

## Data availability

All basic data are available in this doi (10.5281/zenodo.4915772). Data on distress are highly confidential. Therefore, we cannot publish them.

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