



**Karolinska
Institutet**

From Department of Biosciences and Nutrition, Karolinska Institutet (KI)

**‘A 6 month physical activity intervention in university staff: Effectiveness
and health outcomes – The ASUKI Step Study’**

ACADEMIC DISSERTATION

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ABSTRACT

Physical inactivity is regarded a major public health concern and regular physical activity (PA) has been considered as an important lifestyle modification to improve health and prevent chronic disease. Setting the goal at walking 10,000 steps/day as a moderate-intensity form of aerobic PA has been advised to have beneficial health effects in the research and practice areas. The health benefits of walking 10,000 steps per day in regards to cardiorespiratory fitness (CRF), blood pressure (BP), and body composition (BC) still requires further research, since current knowledge is mostly based on data from a limited number of studies. The pedometer is a simple and low maintenance device to create awareness of steps taken and have often been used in challenges and in low cost PA monitoring programs in different settings.

The current thesis aimed to identify demographic determinants for maintenance of walking behavior over the six month intervention among employees from Arizona State University (ASU) and Karolinska Institutet (KI) participating in ASUKI Step study. The study also aimed to examine the results of a 6-month pedometer-determined PA intervention in regards to health in a subgroup of the targeted population, and more precisely to identify health outcomes (BC, CRF, and BP) from a six month pedometer intervention in regards to the number of steps walked. The voluntary participants were asked to maintain a level of 10,000 steps per day. The study used a single group quasi-experimental design. The study included 2,118 employees from ASU and KI. A sub-sample including 357 ASUKI Step participants (ASU = 143, and KI = 214) from the two universities was randomly selected to complete physical fitness testing to determine their BC, resting BP, and CRF and to wear an accelerometer for one week at 0, 3, and 6 months. The pedometer was used as intervention tool as well as to monitor steps taken. Anthropometric measures included height, weight, waist circumference (WC), percent body fat, and sagittal abdominal diameter (SAD). CRF was measured by a submaximal Åstrand-Rhyming cycle ergometer test. Systolic and diastolic BP were taken using an Omron automated BP cuff.

The main findings: There was a significant linear and curvilinear change in steps per day over time, with reported number of steps per day decreasing from the first month of intervention to the last month when all participants were included in the model, and when dropouts were excluded from the analysis, there was no significant decrease in steps from month 1 to month 6. KI participants had a higher initial step count and a slower rate of decline over time. Overall, 52.9% (n = 1105) of the participants accumulated 10,000 steps on at least 100 days of the study. More participants from the KI (59.1%) than ASU (39.8%) met this goal. Older age, being married, working in a non-managerial position, having normal weight, and being categorized with a high activity level (using IPAQ) at baseline were all factors positively associated with meeting the step goal of 10,000 steps per day to a higher level during the days of the intervention. The mean number of steps in month one exceeded the goal of 10,000 steps per day with KI test group participants recording more steps per day than ASU test group participants. Using a conditional model, there was a significant reduction in BMI over time for older participants for the KI test group and there was a significant reduction in WC for middle aged and older participants. There was also a significant reduction in WC over time in the subgroup of females. For ASU test group participants, there was a significant reduction in WC, and minimal changes were found in other anthropometric variables in conditional model over time. There were significant linear and quadratic trends in systolic and diastolic BP over time. There was a significant difference between ASU and KI participants' estimated VO₂ max. The change over time varied by site, where VO₂ max decreased for ASU but stayed essentially the same for KI participants. The number of steps taken was significantly related to changes in estimated VO₂ max over time.

The data reported in this thesis will contribute to better understanding of the association of pedometer-based PA intervention with BC, BP, and CRF, a prerequisite for more efficient health promotion program. Future public health guidelines should consider the evidence-based importance of cues and support as well as of the goal of walking 10,000 steps per day in high risk segments of the population.

Keywords: Physical activity, pedometer, accelerometer, lifestyle intervention, walking 10,000 steps, cardiorespiratory fitness, VO₂ max, body composition, blood pressure, sociodemographic characteristics