Effects of smartphone and smartwatch use while walking: a dual-task study with aging simulation kit F. O. Medola, P. C. R. Oliveira, M. A. Almeida, A. G. Favoretto, R. T. Monteiro, G. Christofoletti.
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Purpose The use of smartphones (SP) and smartwatches (SW) during walking impacts gait stability and increases the risk of accident [1,2]. These effects are pronounced in older adults, who present greater dual-task costs and reduced attentional resources [3]. The current study aimed to investigate the impact of the use of SP and SW on a mobility task in young adults experiencing simulation of the effects of aging. **Method** Ten students (nine female), aged 18 to 31 years (M = 23.0, SD = 4.31), completed a message-sending task using SP and SW under two conditions: standing and walking (dual-task). An aging simulation kit (ASK; Figure 1 [4]) was used to induce restrictions in movement and vision. Task completion time (s) was the primary dependent variable. Data were analyzed separately for standing and walking conditions using descriptive statistics and 2 × 2 repeated-measures ANOVAs (device type × ASK use), with Bonferroni-corrected post hoc comparisons where appropriate. Subjective task difficulty in the dual-task context was assessed using a 5-point Likert scale (1 = very difficult, 5 = very easy). **Results and Discussion** Descriptive analyses indicated that the longest task completion times occurred when sending messages via SW while walking with the ASK (M = 36.59 s, SD = 8.28), compared with the unrestricted condition (M = 21.32 s, SD = 3.60), as shown in Figure 2. Within the ASK condition, the longest completion times were observed when participants walked while using SW (M = 21.32 s, SD = 3.60), indicating increased dual-task costs during locomotion. Repeated-measures ANOVAs revealed a significant main effect of ASK use in both standing ($F(1, 9) = 73.61$, $p < .001$, $\omega^2 = .65$) and walking ($F(1, 9) = 79.83$, $p < .001$, $\omega^2 = .71$) conditions. In the walking condition, ASK use increased task completion time by nearly 14 s ($M_{diff} = 13.96$ s, $t(9) = 8.94$, $p < .001$). Post hoc analyses revealed that, beyond the aging simulation effect, SW use during walking led to significantly longer completion times than SP ($M_{diff} = 2.96$ s, $t(9) = 2.33$, $p < .045$). A key finding was the difference in interaction patterns: in the standing condition, the interaction was significant ($F(1, 9) = 9.04$, $p = .015$, $\omega^2 = .16$), indicating a multiplicative effect in which ASK amplified SW motor demands. In the walking condition, the interaction was not significant ($F(1, 9) = 1.43$, $p = .263$, $\omega^2 = .007$). These results suggest that the total task cost is additive: the high overall attentional demands of dual-task walking (Macpherson, 2018) represent the primary constraint, while SW difficulty adds a significant cognitive load to gait stability, rather than uniquely amplifying age-related limitations. Despite the significant increase in task completion time, perceived difficulty remained low, indicating that participants acknowledged the additional effort without rating the task as particularly challenging. This finding suggests that the increased task completion time during walking may partly reflect subtle gait slowing under dual-task conditions, a phenomenon typically amplified in individuals with age-related motor and visual limitations, as dual-task demands are known to more strongly impair gait under such constraints [5]. SW use during walking should be limited to simple tasks, such as quick micro-interactions, rather than complex actions like typing. This approach leverages the unique advantages of smartwatches, as micro-interactions are better tolerated and appear to support their continuous use.

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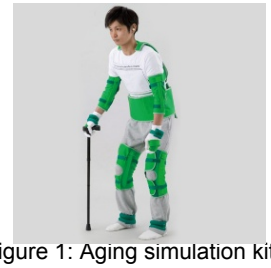

Figure 1: Aging simulation kit [4]

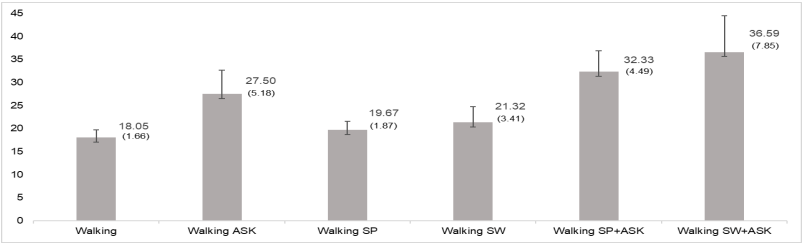

Figure 2: Time (in seconds) to complete the sending-message task while walking