

Resulting estimates were cross-evaluated on a separate sample of 16 participants who performed a sub-set of activities in their home. Results: In the laboratory setting, mean differences between measured and predicted MET value for sedentary (0.36), lifestyle (0.02) and locomotor (0.30) activities were low, but the 95% limits of agreement ranges were relatively large (+/-1.0, +/-1.8, +/-3.1, respectively). Data features were 85%, 88%, and 71% accurate for identifying sedentary, lifestyle and locomotor activities. Prediction equations had an overall mean difference of 0.19 METs (95% limits of agreement = -1.3 to 1.7) when activities were performed at home. Conclusion: Data features extracted from a wrist worn tri-axial accelerometer provide a moderate-to-high group estimate of metabolic intensity and had modest accuracy in identifying activity types across a variety of daily activities. However, significant between person variations were evident. Additional work is needed to refine wrist-worn accelerometers for estimating physical activity type, intensity, duration and frequency across the age spectrum.

#### DETECTION OF FORWARD PROPULSION USING A SINGLE ACCELEROMETER DURING WALKING IN OLDER POPULATION

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In the geriatric population, diminished ankle joint moment and weak plantar flexor can contribute to inadequate forward propulsion and negatively impact gait performance, which can lead to poor energetic efficiency. Detection of propulsion phase can help identify gait normality and guide rehabilitation therapy to improve functional performance. Current methods have limited application in daily life and unsuitable for continuous monitoring. In this study, we aim to develop algorithms based on a single sensor attached to the shin to accurately detect propulsion phase. Six elderly (age: 73 years, BMI: 30.4) were recruited. Participants walked at their normal pace while wearing a plantar pressure system and an accelerometer on the shin. The pressure data was used to define the beginning of the propulsion phase when the pressure switched from the heel to the forefoot. A wavelet algorithm was developed to automatically detect the start and end points of propulsion phase using an accelerometer. The Bland-Altman method was used to evaluate the agreement between these methods. Pearson's Coefficient was used to quantify the correlation. Based on the Bland-Altman analysis, A high agreement was obtained between the proposed method using accelerometer and pressure sensor (bias = 9 ms, precision = 30 ms). Both algorithms are significantly correlated ( $r = 0.85$ ,  $p < 0.05$ ). This study presents an innovative algorithm to automatically detect the propulsion phase for older adults during walking. Using wearable could facilitate the capture of propulsion phase during living activity, which might provide more insights into the mechanism of walking during rehabilitation therapy.

**LONG-TERM GAIT SPEED TELEMONITORING IN OLDER ADULTS WITH MILD COGNITIVE IMPAIRMENT OR MILD DEMENTIA. THE DECI STUDY**  
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Non-intrusive telemonitoring of physical activity in Older Adults suffering from Mild Cognitive Impairment (MCI), or Mild Dementia (MD), was implemented as part of a 6-month multicomponent digital intervention in the DECI study (EU Horizon2020 grant No 643588). Methods: To estimate gait speed long-term trajectory, a processing algorithm was applied on individual accelerometry data continuously recorded via the ADAMO wrist-watch accelerometer. Speed Trend Analysis was performed if patients wore the device  $\geq 90$  days. Only outdoor activity was analyzed to reflect patients' own natural gait speed. Only time spent in high or very-high-activity level is used, to eliminate rest periods (e.g. sitting on a bench, on a bus or driving). A raw mean walking speed was computed. Stride was computed from gender and height and walked distance from stride and step count. Mean walking speed was estimated by walking distance and duration. A rolling mean algorithm was applied to the computed mean 15-day baseline series, resulting in a new series representing normalized patient's gait speed trajectory during the study. Results: Baseline characteristics: F/M=21/19; MCI/MD=36/4; age=75.4 $\pm$ 6.0 years; BMI= 24.6 $\pm$ 5.2; MMSE=26.5 $\pm$ 2.4; education=8.9 $\pm$ 4.0 years. Monitoring days=147 $\pm$ 29. Overall three main patterns of gait speed trajectory were identified: "relative stability", "improving trend" and "progressive decline": No evident correlation with cognitive status was observed in the sample. Examples of individual patterns are shown. Conclusions: Gait Speed Analysis can describe physical function trajectory over time and identify decliners from stable or improving older adults. Further analyses may clarify the relationship between physical function changes and cognitive status.

#### AGE- AND ETHNICITY-RELATED DISPARITIES IN TECHNOLOGY USE AMONG HIGH-RISK VETERANS

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Using predictive analytic modelling, the Veterans Affairs has identified Veterans considered to be High Need High Risk (HNHR) requiring increased support. This pilot study sent needs assessment questionnaires to 1112 HNHR Veterans to better understand gaps regarding technology use, access, physical function, and mobility. There were 341(30.7%) respondents: 270(80.4%) Non-Hispanic, 64(18.8%) Hispanic/Latino; 210(61.6%) White, 119(34.9%) Black/African Americans; and 310(90.4%)

had  $\geq$ high school education. Average Barthel(ADL) score was  $81.5 \pm 22.8$  and Lawton(IADL) score was  $5.8 \pm 2.2$ . Younger Veterans (age $<$ 70) were more likely able to use Internet ((117(65%) vs 74(46%)), ( $p \leq 0.01$ ) and email (106(58.9%) vs 67(41.6%)), ( $p \leq 0.01$ ). They were also more likely enrolled in MyHealtheVet (87(48.3%) vs 58(36%)), ( $p = 0.043$ ). Secure messaging was used by 62(34.3%) younger and 37(23%) older Veterans, ( $p = 0.026$ ). More higher functioning Veterans (140(55.1%)) used email than lower functioning (33(37.9%)), ( $p = 0.018$ ). Among higher functioning Veterans, 148(58.3%) were willing to use videoconference for care coordination and 116(45.7%) owned a smartphone or computer with camera for this; more than lower functioning Veterans (33(37.9%) and 28(32.2%)), ( $p \leq 0.01$  for both). Less dependent Veterans preferred to be contacted via cellphone (88(62.4%)) or Internet (10(7.1%)) compared to the more dependent (96(48%) and 6(3%)) respectively ( $p = 0.01$ ). Only 71(44.1%) of older Veterans were willing to use videoconference ( $p \leq 0.01$ ) and 54(33.5%) owned a smartphone or computer with camera, ( $p \leq 0.01$ ). There are significant variations in technology use by age and ethnicity. However, although there are differences by functional ability, a significant number of disabled veterans are willing and able to use technology, and this may provide a way to address access barriers in this population.

#### WEBCAMERA-BASED VISUAL PAIRED COMPARISON AS A REMOTE COGNITIVE SCREENING METHOD

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Alzheimer's disease (AD) is a form of dementia impacting memory and cognitive function of 131 million individuals worldwide. Though early cognitive decline detection is important, cognitive screening is limited among older adults and many cases go undetected. As easy-to-use cognitive assessments are not readily available to the general population, the purpose of this investigation was to determine the ability of a 5-minute webcam-based eye-tracking cognitive assessment to discriminate between cognitively intact adults and adults with mild cognitive impairment (MCI) or AD. This prospective study included 56 participants (age= $55.9 \pm 26.8$ ) divided into three groups: younger cognitively intact (ages 18-46 years,  $n = 25$ ), older cognitively intact (ages  $>60$  years,  $n = 20$ ), and older cognitively impaired participants with MCI or AD (ages  $>60$  years,  $n = 13$ ). All participants completed the Digit Symbol Substitution Test (DSST) and Visual Paired Comparison test (VPC) to assess cognition. One-way ANOVA detected differences in cognition between groups. A Pearson correlation determined the association between cognitive assessments. Additionally, multiple regression determined the ability of VPC and age to predict DSST scores. Results revealed significant differences between cognitively intact and cognitively impaired groups for VPC ( $p = .001$ ) and DSST ( $p < .001$ ). Follow-up analyses revealed significant differences between cognitively intact and cognitively impaired adults ( $p = .005$ ) with no differences between younger and older cognitively intact adults ( $p = .34$ ). There was a significant association between the VPC and DSST cognitive assessments ( $r = .54$ ,  $p < .001$ ), with VPC and age accounting for 69% of the variation in DSST.

These results support the use of webcam-based VPC as a viable option when screening tool MCI/AD.

#### FEASIBILITY OF MOBILE HEALTH FOR LOW-INCOME MINORITY HISPANIC PATIENTS WITH A STROKE

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Stroke is a leading cause of death and functional impairment that disproportionately impacts Hispanics. Several studies have supported the feasibility of mobile health interventions (mHealth) to provide health monitoring and patient education for improving chronic disease management, but none have focused on Latino stroke patients. The Hispanic Secondary Stroke Prevention Initiative is a randomized study of 200 stroke patients designed to evaluate the impact of a 12-month multi-modal Community Health Worker (CHW) and mHealth intervention on blood pressure control. Eligible participants were Latinos who experienced a mild-moderate stroke within the last five years. The CHW component included home visits, telephone calls, and daily text messages to obtain home blood pressure readings and provide patient navigation and health education. Feasibility was defined as the proportion of patients that responded to at least half the messages. Pre-post paired t-tests assessed improvements in question accuracy while correlation coefficients highlighted improvements in response rates. Among the 65 participants randomized to the intervention, the response rate was as follows: 37% -  $>50\%$  response, 21% - 25-50%, 19% - 10-25%, and 23% -  $<10\%$ . This finding suggests that mHealth interventions may be challenging in this population. However, the proportion of questions answered correctly increased from 63% to 84% in the intervention period's last two months ( $p < 0.05$ ). There was a positive correlation between increased response rates and response accuracy to patient education assessments ( $r = 0.82$ ,  $p < 0.05$ ). These improvements in health knowledge suggest that a subset of patients may benefit from mHealth interventions, and the benefit correlates with use.

#### NOVEL REMOTE ASSESSMENT OF THE STANDING POSTURAL CONTROL IN YOUNGER AND OLDER ADULTS USING SMARTPHONE APPLICATION

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In older adults, assessment of standing postural control under various task and/or environmental conditions provides valuable insight into cognitive-motor function. To date, however, such assessments have been limited primarily to laboratory or clinical settings. We therefore created a smartphone App to enable remote assessments of postural control. This App provides users with standardized multi-media instructions and harnesses the phone's internal motion sensors to capture postural sway, with the phone placed in the user's pants pocket, during trials of standing with eyes open, eyes-closed,