Patterns of physical activity (PA) may be associated with physical function independently of total volume. The study aim was to explore associations of PA fragmentation (PAF) and function in ≥65-year-old European adults (SITLESS study: n=1360). The ActiGraph wGT3X+ accelerometer was worn for seven consecutive days at the dominant hip. PAF was assessed as the ratio of the number of ≥10-second PA bouts divided by an individual's total minutes in PA. Physical function was assessed using the 2-minute maximum walk test (2MWT) and short physical performance battery test (SPPB). Multiple linear regression was utilized for relevant covariates. Lower PA fragmentation was significantly (p<0.01) associated with longer 2MWT distances and better SPPB scores. The model explained 54% and 41% of the variance in the 2MWT distance and in SPPB score, respectively. Increased PAF seems associated with reduced physical function; independent of sedentary behavior and numerous important health and socio-demographic covariates.

DAILY PHYSICAL ACTIVITY PATTERNS AND THEIR ASSOCIATION WITH HEALTH-RELATED PHYSICAL FITNESS AMONG AGING WORKERS
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This study aimed to identify accelerometer measured daily physical activity patterns and to examine how they associate with health-related physical fitness among 258 participants (mean age 62.4 years, SD 1.0) from the Finnish Retirement and Aging Study. Wrist-worn ActiGraph accelerometer was used and health-related physical fitness measures included body composition, cardiorespiratory fitness and muscular fitness. Based on latent class trajectory analysis, six different patterns of daily physical activity was identified on weekdays and two on days off. Having low activity throughout the workday was associated with poorest health-related physical fitness, whereas a combination of low or moderate activity during working hours and increase of activity level in the evening was associated with most favorable body composition and better physical fitness compared to the other trajectories. In conclusion, a large variation in the workday physical activity patterns and health-related physical fitness was observed among aging workers.

SESSION 7200 (SYMPOSIUM)

PREFRONTAL CORTEX CONTROL OF WALKING: FUNCTIONAL NEAR-INFRARED SPECTROSCOPY AND BEYOND
Chair: Andrea Rosso
Discussant: Roee Holtzer

Cognitive control of walking may change with aging and is associated with poorer mobility and greater fall risk. The prefrontal cortex function is important for cognitive control of walking, and functional near-infrared spectroscopy (fNIRS) provides the primary means for assessing prefrontal activation during walking. Growing interest in fNIRS to assess cognitive control of walking has led to advancements in the methodologies for processing and analyzing the data, a greater sophistication of experimental protocols and participant samples, and implementation within intervention studies. These advancements will be highlighted in five presentations from an international group of researchers at the forefront of the field. First, Meltem Izzetoglu will provide direct comparisons of various data processing methodologies, demonstrating comparability across approaches. Three talks will demonstrate the range of applications of fNIRS to studying walking in older adults. Nemin Chen will present data on task-related patterns of prefrontal activation across walking tasks in relation to performance, cognitive function, and structural brain health. Sarah Fraser will present results from stair climbing, a critical task for daily function which also presents a fall risk. Inbal Maidan will examine how individual differences affect prefrontal activity during walking across older adults, younger adults, and patients with Parkinson’s disease or multiple sclerosis. Finally, David Clark will demonstrate the use of fNIRS in assessing outcomes from an intervention that combined walking with non-invasive frontal brain stimulation. Roee Holtzer will lead a discussion of the results and the future of fNIRS in assessing cognitive control of walking in older adults.

ASSESSMENT OF FNIRS PROCESSING METHODS ON ACTIVE WALKING DATA: FINDINGS AND IMPLICATIONS FOR FUTURE RESEARCH
Meltem Izzetoglu,1 and Roee Holtzer,2 1. Villanova University, Villanova, Pennsylvania, United States, 2. Yeshiva University, Bronx, New York, United States

Functional near infrared spectroscopy (fNIRS) studies utilized a limited and inconsistent number of processing algorithms to assess the prefrontal activity during active walking. To address this critical limitation, we have reanalyzed our large dataset of older adults (n=83) who underwent single and dual-task walking (STW and DTW) protocol by applying different hemodynamic conversion parameters and movement and physiological artifact removal methods. Linear mixed effect model results indicated significant increases in oxygenated-hemoglobin (HbO2) with expected decline in deoxygenated-hemoglobin (Hb) from STW to DTW (range of effect sizes: 0.59 to 0.64 for HbO2, 0.18 to 0.23 for Hb). These findings were consistent across different processing methods and highlight the need for improved and standardized processing methods for accurate assessment of prefrontal activity during walking.
to 0.32 for Hb) irrespective of the methods used. In addition, intraclass correlations suggested excellent reliability across methods and task conditions (HbO2 range=0.982 to 0.996; Hb range=0.883 to 0.984). These findings support fNIRS as a robust approach for measuring prefrontal activity in older adults during walking and emphasize the importance for establishing explicit guidelines/principles for fNIRS processing.

PATTERNS OF PREFRONTAL ACTIVATION AND PERFORMANCE DURING WALKING TASKS AMONG OLDER ADULTS
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Differences in prefrontal cortex (PFC) control of walking in older age likely arise from changes in neural capacity and compensation. PFC activation by changes in oxygenated hemoglobin from functional near infra-red spectroscopy was examined in 29 older adults (mean age=76). Tasks included standing with cognitive challenge and walking with and without cognitive challenge on even and uneven surfaces. Three PFC activation-performance patterns were identified using K-means clustering: 1) low activation during walking tasks and high activation during standing cognitive task, with the best performance in terms of walking speed and cognitive performance (n=10); 2) low activation on all tasks, with the lowest performance (n=15); 3) high activation during walking and low activation during cognitive, with intermediate performance (n=5). Associations of patterns with cognitive function and structural neuroimaging were explored, with results informing interpretation of functional changes of PFC during aging process, including compensatory mechanisms for primary network impairment.

USING FNI R S TO CAPTURE CEREBRAL OXYGENATION IN OLDER ADULTS NAVIGATING STAIRS
Sarah Fraser,1 Talia Salzman,1 Hyejun Kim,1 Hawazin Badawi,2 Diana Tobon Vallejo,2 Yves Lajoie,1 Lara Plutti,1 and John Farrell III,1 1. University of Ottawa, Ottawa, Ontario, Canada, 2. Universidad de Medellín, Medellín, Antioquia, Colombia

Navigating stairs is a complex motor activity and while it provides health benefits it can also increase the risk of falls in older adults (OA). The prefrontal cortex (PFC) contributions to stairclimbing (with or without a cognitive task) remain unknown. Using functional near infra-red spectroscopy (fNIRS) and wireless insoles, this study evaluated cerebral oxygenation changes (ΔHbO2) in the PFC, gait parameters (speed) and cognitive performance (reaction time/RT/accuracy) during stair ascent and descent in single (SMup/SMdown) and dual task (DTup/DTdown) conditions. OAs navigated stairs with or without a simple reaction time task. Participants had longer RTs in DTup (p < .001) and DTdown (p < .001) in comparison to standing, with no significant differences in accuracy or walk speed. ΔHbO2 was significantly different (p = .003) between SMdown and DTdown. Findings suggest that despite the simplicity of the cognitive task, dual-tasking on stairs resulted in increased cerebral oxygenation and slowed cognitive responses.

OVERLAP, COMMONALITY, DISPARITY, AND VARIABILITY OF FRONTAL LOBE ACTIVATION IN AGING AND NEURODEGENERATION
Inbal Maidan,1 Hagar Bernad-Elazari,2 Roni Hacham,2 Jeffrey Hausdorff,2 and Anat Mirelman,2 1. Tel Aviv Sourasky Medical Center, Tel Aviv, Israel, 2. Tel Aviv Sourasky Medical Center, Tel Aviv, Tel Aviv, Israel

Recent work suggests that the prefrontal cortex is recruited during complex walking as a form of cognitive compensation to maintain performance in aging and neurodegenerative diseases. Evidence from fNIRS studies is accumulating on different patient groups demonstrating the utility of this method and its sensitivity to neural dysfunction. However a direct comparison that explores the specificity of prefrontal activation patterns has not been conducted. This process is essential towards implementing the use of fNIRS at the individual level. Data collected from four different cohorts: young adults, older adults, PD patients at different stages of the disease, and patients with Multiple-Sclerosis during challenging tasks will be presented. Overlap, commonality, disparity and variability between groups and conditions will be presented and modiflers and moderators that can affect individual performance will be discussed. Understanding individual differences in fNIRS response will enhance data interpretation and promote translation of this technology to clinical care applications.

FNI R S OUTCOMES FOR A PILO T CLINICAL TRIAL COMBINING FRONTAL TDCS WITH WALKING REHABILITATION IN OLDER ADULTS
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This pilot study assessed a novel intervention to enhance both walking and executive function in older adults. The primary hypothesis was that eighteen sessions of frontal lobe tDCS combined with walking rehabilitation would be feasible, safe, and show preliminary efficacy. Eighteen participants were randomized to one of three intervention groups: active tDCS and rehabilitation with complex walking tasks (Active/Complex); sham tDCS and rehabilitation with complex walking tasks (Sham/Complex); or sham tDCS and rehabilitation with typical walking (Sham/Typical). Outcome measures included multiple tests of walking function, executive function, and prefrontal activity during walking as measured by functional near infrared spectroscopy (fNIRS).