PAPER

Sensors and Monitoring

W.D. KEARNS, J.L. FOZARD, A. KUMAR. Longitudinal analysis of ALF resident wandering using real-time location services: Results of a yearlong study. Gerontechnology 2018;17(Suppl):111s; https://doi.org/10.4017/gt.2018.17.s.108.00 **Purpose** Wandering behavior in persons with dementia increases the likelihood of adverse events, e.g., getting lost, falling, and death from injuries[1]. Over 20 systematic descriptions of wandering create subcategories of travel patterns during wandering[2]. One of the most widely accepted wandering typologies is Martino-Saltzman's[3] who differentiated travel into direct, random, lapping, and pacing. When trained observers manually coded occurrences of each category, random travel was the least reliably identified although it was more frequently observed than lapping and pacing. Advances in indoor real-time location services (RTLS) provide pinpoint subject tracking over many months allowing observation of evolving wandering travel patterns in multiple individuals to be evaluated simultaneously, however sensitive algorithms capable of extracting patterns from large datasets have been lacking. Kumar et al.[4] demonstrated an analytic technique capable of automatically translating RTLS movement data into Martino-Saltzman's four categories using a one-month pilot sample of 14 assisted living facility (ALF) residents gathered by Kearns, Fozard, Nams and Craighead[5]. **Method** An extant RTLS dataset with 43M records collected from 53 ALF residents over 1 year by Kearns et al. Craighead[6] that included Fractal Dimension values for each travel episode for each month was retrospectively analyzed using Kumar et al.'s[4] algorithm to synthesize the four Martino-Saltzman categories. Thirty-nine of 53 subjects had sufficient data to estimate monthly percentages of each Martino-Saltzman category for reliability analyses using Cronbach's Alpha. **Results & Discussion** The most frequently occurring category was random travel (mean=64.3% SD=10.9, range 44.2% to 85.9%), followed by direct (mean=25.0% SD=10.9, range 6.4% to 48.8%), lapping (mean=8.4% SD=5.9, range 0.49% to 29.3%) and pacing (mean=2.3% SD=2.3, range 0% to 14.0%). Cronbach's Alpha on the categorical typology revealed direct travel achieved the highest Alpha value of 0.966, followed by random at 0.949, lapping at 0.938, and pacing at 0.799 indicating acceptable temporal stability in all categories. The highest Cronbach's Alpha achieved overall was for Fractal Dimension at 0.988. Significant correlations were found between Fractal Dimension and direct (r= -.59, n=53 p< .01) random (r= .68 n=53 p<.01) and lapping (r= -.29 n=53 p<.05) categories, but not pacing. Associations between the Martino-Saltzman categories and the Mini Mental State Exam (MMSE)[7] score obtained at the beginning of the study were significant for random (r=-.29 n=53 p<.05) and lapping which was paradoxically *positively* correlated with MMSE (r=.32 n=53 p<.05). MMSE scores were significantly negatively correlated with yearly mean Fractal Dimension values (r= -.39, n=53 p<.01) indicating that although the Martino-Saltzman categories and Fractal Dimension shared variance, Fractal Dimension outperformed the Martino-Saltzman's categories as a predictor of cognitive impairment in these subjects.

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