

S.T. MEJÍA, K.E. NIELSEN, H. ZAINULBHAI, A. CARMICHAEL, V. RAICHUR, R. GONZALEZ. *Insight into intraindividual variability in life space via GPS monitoring of daily activity. Gerontechnology 2018;17(Suppl):114s*; <https://doi.org/10.4017/gt.2018.17.s.111.00>

Purpose Life space describes the spatial magnitude of daily life and is a behavioral correlate of older adults' mental and physical well-being¹. Over the last decade, research has shown that GPS technology provides a valid measurement of life space². However, a hallmark of aging is heterogeneity, both within and across individuals³, suggesting that a proper characterization of life space requires attention to intraindividual variation around mean tendencies. A first step in creating technologies that leverage life space to support successful aging is to define daily spatial movement patterns in a population at risk of diminished life space. Individuals with adult incontinence (AI) demonstrate heightened attention to variability in daily experiences and may limit daily activities to minimize the consequences of an unintentional leakage⁴. In this research, we monitor the daily spatial movement patterns of women with incontinence over a 5-week period to investigate the extent of day-to-day intraindividual variability and change in life space. **Method** The study protocol was approved by the University of Michigan Institutional Review Board. A total of 10 community-residing women (age 40 - 65) who independently manage severe to moderate experiences of incontinence and are familiar with smartphone use were recruited to test the feasibility and utility of measuring intraindividual variability and change in life space. After screening into the study and providing informed consent, participants described their experiences with AI and the extent to which it limited their daily activity via an online questionnaire. Before beginning the daily portion of the study, participants visited the lab to be oriented to the study and complete a self-reported life space profile. Researchers worked with participants to locate their residences and most frequent destinations. Destination types were standardized to allow for comparison across persons. Locations of interest included places of work, recreation, and exercise; as well as places participants went to spend time with friends and family and do errands (such as the grocery store). Researchers explored several possible codings of the labeled spatial data to extract meaningful values, including: distance from home (continuous, and in discrete categories represented in the original life space measure); number of trips away from home, nature/necessity of trips, novelty of destinations, and time away from home. **Results & Discussion** Time series analysis, taking into account spatial and temporal autocorrelation, showed life space to vary considerably within individuals. The within-person patterns of day-to-day variation in the distance traveled and diversity of places visited demonstrated a complexity in life space that is lost when conceptualized only as mean tendencies. As expected from the extant survey research on AI experiences, occurrence of unexpected leakages was found to have implications for life space. Our findings demonstrate that life space varies in meaningful patterns within-persons. Insight from life space—including not only the magnitude, but also the diversity of space traveled in a given day and across days—could assist in the development of technologies that employ life space relevant feedback to assist older adults in their efforts to age successfully.

References

1. Baker PS, Bodner EV, Allman RM. Measuring Life-Space Mobility in Community-Dwelling Older Adults. *Journal of the American Geriatrics Society*. 2003;51(11):1610-1614. <https://doi.org/10.1046/j.1532-5415.2003.51512.x>
2. Wan N, Lin G. Life-space characterization from cellular telephone collected GPS data. *Computers, Environment and Urban Systems*. 2013;39:63-70. <https://doi.org/10.1016/j.compenvurbsys.2013.01.003>
3. Diehl M, Hooker K, Sliwinski MJ. *Handbook of Intraindividual Variability across the Life Span*. Routledge; 2014
4. Takahashi K, Sase E, Kato A, Igari T, Kikuchi K, Jimba M. Psychological resilience and active social participation among older adults with incontinence: a qualitative study. *Aging & Mental Health*. 2016;20(11):1167-1173. <https://doi.org/10.1080/13607863.2015.1065792>

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Address: Univ. of Illinois at Urbana-Champaign, IL; Univ. of Michigan, Ann Arbor, MI;

E: stmejia@illinois.edu