

Tracking & cognition

F. OSWALD, H-W. WAHL, N. SHOVAL (Conveners). Tracking older adults of various levels of cognitive health: Findings of the SenTra consortium. Gerontechnology 2010;9(2):153; doi:10.4017/gt.2010.09.02.082.00 **Participants:** M. ISAACSON (ISRAEL), F. OSWALD (GERMANY), G. AUSLANDER (ISRAEL), R. LANDAU (ISRAEL), and H.-W. WAHL (GERMANY). **ISSUE** One of the behavioral manifestations of dementia-related disorders is severe problems with out-of-home mobility. The interdisciplinary project SenTra (“senior tracking”) measures outdoor mobility by means of Global Positioning System / Geographical Information System (GPS/GIS) tracking technology among urban living older adults with dementia (PWD), mildly cognitively impaired (MCI) and cognitively healthy individuals in Israel and Germany. The primary aims of SenTra are (i) to gain a fine-tuned record of out-of-home mobility which is hard to achieve with traditional questionnaire oriented data-collection, (ii) to analyze the relationships between cognitive functioning, out-of-home mobility, and well-being related data, and (iii) to examine ethical implications in the use of advanced tracking technologies. **STRUCTURE** The symposium will present data from the first measurement point driven by SenTra’s interdisciplinary approach, that is, geography, psychology and psychiatry, social work and ethics. The symposium ends with a resume of the potential of SenTra for research and application and a general discussion. **CONTENT** Findings from the first measurement point objective tracking-analyses showed that cognitive impairment is related to outdoor mobility indicators, such as the spatial range and time out of home spent in close proximity to their residences. From a predictive perspective the data (also mobility diaries) showed that healthy, young and male participants who live alone have a greater daily action range. Analyses of the relationship of mobility and well-being showed for instance, that time out of home and place attachment is linked to depression, particularly among mildly cognitively impaired participants. As ethical implications are concerned, our data underline to differentiate between family caregivers’ and professionals’, when it come to using tracking technology. **CONCLUSION** Findings revealed that GPS/GIS is an advanced research tool able to understand out-of-home behavior better than it was possible with previous methods. However, challenges for analyzing outdoor mobility patterns in the face of dementia-related disorders do exist, particularly due to high mentoring effort and ethical considerations. By and large, tracking technology may help to learn how environmental freedom and autonomy at large can be enhanced in the human condition of severe cognitive loss.

Keywords: GPS, out-of-home mobility, cognitive impairment, dementia, old age

Address: Goethe University Frankfurt, Faculty of Educational Sciences, Interdisciplinary Ageing Research, Germany; E: oswald@em.uni-frankfurt.de

M. ISAACSON, N. SHOVAL. Repetition and routine in the lives of elderly people. Gerontechnology 2010;9(2):153-154; doi:10.4017/gt.2010.09.02.083.00 **Purpose** Routines are part of our daily lives and have been studied extensively throughout the past three decades. Routines are created both as a human habit and as a pragmatic way of dealing with the complex urban environment. Routine behavior dismisses the need to make countless decisions on a daily basis and allows people to function within a set of predetermined decisions. Human activity is highly influenced by the time of day; store opening hours, work hours and school hours are just a few examples. The strong importance of clock time leads to behavior that is highly routine. That said, human spatial behavior also has a great amount of variance. Variance in spatial behavior is created by changing needs that need to be addressed through travel and movement, one

day groceries need to be bought and on another day a trip to the post office is needed. People react to congestion in the transportation system by changing their routine. Adjusting departure times to not coincide with traffic or changing travel routes or destinations are ways that people react to information regarding congestion of the transportation network. The change in the opportunities available to a person at different times adds to the variability of travel behavior. One of the prerequisites to studying routine is the collection of data describing time-space activities over a period of multiple days at least and preferably multiple weeks. The collection of such data is not a simple task and has not been done very frequently but has been done successfully and thus proven to be a feasible task. Time-space data that describe daily activity and that is collected by GPS is becoming more widespread and has become readily available to an extent that it has not been before. This new source of data introduces both levels of detail and large quantities of data that were unobtainable using the traditional methods for collecting data on time-space activity. **Method** Findings are based on spatial data that was collected during 28 consecutive days as part of the SenTra project^{1,2}. SenTra is an Israeli-German project that studies the mobility of people with Alzheimer's disease and other related cognitive disorders using GPS and RFID technology. **Results & Discussion** This paper presents an analysis of the elements of repetition and routine in the lives of elderly people living in the Tel Aviv metropolitan area. In addition, this paper poses the question as to whether high resolution data has the potential to shed light on the amount of repetition in our daily lives in ways that were not possible using traditional travel diary data.

References

1. Oswald F, Wahl H-W, Voss E, Schilling O, Freytag T, Auslander G, Shoval N, Heinik J, Landau R. Journal of Housing for the Elderly, in press
2. Shoval N, Auslander GK, Freytag T, Landau R, Oswald F, Seidl U, Wahl H-W, Werner S, Heinik J. BMC Geriatrics 2008;8:7; doi:10.1186/1471-2318-8-7

Keywords: GPS, spatial activity, routine, old age, out of home mobility

Address: The Hebrew University of Jerusalem, Faculty of Social Sciences, Department of Geography, Jerusalem, Israel; E: Michal.Isaacson@mail.huji.ac.il

F. OSWALD, H.-W. WAHL, E. VOSS, O. SCHILLING, U. SEIDL, T. FREYTAG, M. WETTSTEIN. Tracking older adults of various levels of cognitive health in the project SenTra: Findings from a psychology perspective. Gerontechnology 2010;9(2):154-155; doi:10.4017/gt.2010.09.02.084.00

Purpose The interdisciplinary project SenTra measures out-of-home mobility by means of tracking technology among community-dwelling persons with dementia (PWD), mildly cognitively impaired (MCI) and healthy individuals, aged 61-89 in Israel and Germany^{1,2}. Participants undergo an extensive psychiatric examination, a broad set of psychological assessments as well as having to complete daily mobility diaries including post-hoc evaluation of activities and mood. The aim of this presentation is (i) to describe differences between healthy, MCI and PWD in basic psychological and psycho-social indicators (for instance, SES, place attachment, health, life satisfaction, affect, depression, anxiety), (ii) to analyze relationships between personal (age, gender, health) and environmental predictors (living alone) and out-of-home mobility indicators (for instance, time out-of-home based on the tracking and on mobility diaries), as well as between outdoor mobility indicators and well-being outcomes (life satisfaction, affect), and (iii) to illustrate individual variability in these measures for the three groups.

Method Findings are based on interviews and tracking protocols over 4 weeks from the first measurement point (n=101, including 66 healthy, 23 MCI, and 12 PWD). **Results & Discussion** Although cognitive impairment seems not to be directly related to out-of-home mobility in terms of global time-based indicators (for instance, time out of home), analyses including data from mobility diaries showed that for instance, combined time x distance evaluation indicators (frequency or number of trips) revealed differences, particularly between cognitively unimpaired and PWD. Analyses of relationships between personal indicators and out-of-home mobility show, for instance, that healthy, younger and male participants, who live alone have a greater daily action range (maximum distance per day). As variability in both indicators over 4 weeks is concerned, PWD seem not to be much different from MCI and unimpaired partici-

pants. In conclusion, tracking technology may help to learn how environmental freedom can be enhanced with dementia and used in everyday life.

References

1. Oswald F, Wahl H-W, Voss E, Schilling O, Freytag T, Auslander G, Shoval N, Heinik J, Landau R. Journal of Housing for the Elderly, in press
2. Shoval N, Auslander GK, Freytag T, Landau R, Oswald F, Seidl U, Wahl H-W, Werner S, Heinik J. BMC Geriatrics 2008;8:7; doi:10.1186/1471-2318-8-7

Keywords: out-of-home mobility, cognitive impairment, psychology, well-being, old age

Address: Goethe University Frankfurt, Faculty of Educational Sciences, Interdisciplinary Ageing Research, Germany; E: oswald@em.uni-frankfurt.de

G.K. AUSLANDER, T. GITLITZ, S. WERNER, R. LANDAU, N. SHOVAL, J. HEINIK. *Caregiver burden of family members of cognitively impaired old people: The relationship with elders' quality of life and time-space behavior. Gerontechnology 2010;9(2):155*; doi:10.4017/gt.2010.09.02.085.00 **Purpose** Cognitive impairment among old people can have a deleterious effect upon their family members. This study explores various factors that may be related to caregiver burden, including the relationship of the elder's time and space behavior, as measured by GPS tracking in the SenTra Program. **Method** 75 people aged 60 or over with Mini-mental scores of 21 or higher, who are otherwise healthy and mobile were included in the sample. All participants were tracked using the SenTra GPS system for 28 consecutive days, 24 hours a day. In addition, the participants and a family member (caregiver or potential caregiver) completed a detailed psycho-social inventory, including selected subscales of the SF-36 health questionnaire, the PANAS scale for positive and negative affect, the CamCog instrument for cognitive impairment and Neuropsychiatric Inventory (emotional expressions). Caregivers also completed the Zarit (short-form) Burden Scale. **Results & Discussion** 48% of the participants were male; 67% were married and 69% lived with other people. Ages ranged from 62-88 (M=75, SD=6.5), and education ranged from 4-20 years (M=12, SD=3.6). 33% (n=25) were cognitively intact; 49% were diagnosed with Mild Cognitive Impairment and 18% had mild dementia. Among family members 68% were female; 84% were married. Ages ranges from 24-80 years (M=61, SD=13.7). Regarding burden, 14% reported no feelings of burden, while 5% reported high levels of burden (range=0-34, M=9.9, SD=8/5). At the bivariate level both Mini-mental scores and CamCog scores were negatively correlated with Caregiver burden ($r=-0.30$, $p<0.01$; $r=-0.265$, $p<0.05$, respectively, as was physical functioning ($r=-0.22$, $p<0.05$). Other dimensions of the SF-36 were not related to burden. Irritability was positively related to burden ($r=0.36$, $p<0.01$). Two geographical measures were negatively related to burden: the number of 'nodes', or points, at which the participant stopped for at least 5 minutes ($r=-0.45$, $p<0.001$) and the standard deviation of the number of notes ($r=-0.59$, $p<0.001$). The latter is a reflection of variability in daily mobility patterns. In the multivariate analysis, the variables most strongly related to caregiver burden were female gender of the participant, irritability, and variability in nodes. The findings show that in the multivariate analysis, it is not the participants' cognitive impairment that relates to caregiver burden, but rather their behavior – both interpersonal and mobility behavior.

Keywords: out-of-home mobility, cognitive impairment, psychology, well-being, old age

Address: Paul Baerwald School of Social Work and Social Welfare, The Hebrew University of Jerusalem, Israel; E: msgail@mscc.huji.ac.il

R. LANDAU, S. WERNER, G. AUSLANDER, N. SHOVAL, J. HEINIK. *Attitudes of family and professional caregivers towards the use of GPS for people with dementia. Gerontechnology 2010;9(2):155-156*; doi:10.4017/gt.2010.09.02.086.00 **Purpose** Electronic tracking devices such as GPS may enhance the safety of older people with dementia by alerting caregivers to potential dangers in wandering. Yet, while some view electronic tracking as a way of creating a more secure environment and promoting individual autonomy for vulnerable persons with dementia, others view it as stigmatizing and threatening their autonomy and privacy. **Method** The study presented here examined the attitudes of family and professional caregivers towards the use of GPS for people with dementia. It is based on data collected from a conveni-

ence sample of 69 family and 96 professional caregivers of community-dwelling persons with dementia in Israel, using a structured, self-report questionnaire. **Results & Discussion** The findings suggest a new approach to conceptualizing caregivers' views regarding the use of GPS for tracking persons with dementia. Instead of the dichotomous attitude of either favoring or opposing the use of these devices, the results suggest a more complex approach, in which caregivers' attitudes range from obligation to use the tracking device for the patients' safety through support of the use of the device for the caregivers' peace of mind and restricted support, to objection to the use of the device and respect for a person's autonomy. Family caregivers showed higher support for the use of GPS both for their own peace of mind and for the safety of the person in their care. Professionals attached higher value to respect for a person's autonomy and restricted support for using electronic tracking devices. Considering some family caregivers' difficulty to choose between safety versus autonomy and privacy of their relatives, professionals should offer their services and be actively involved in facilitating the decision making process regarding electronic tracking of people with dementia.

Keywords: GPS, family caregiver, professional caregiver, attitude, dementia

Address: The Hebrew University of Jerusalem, Paul Baerwald School of Social Work and Social Welfare, Jerusalem, Israel; E: shirlor@mscc.huji.ac.il

H.-W. WAHL. Potential of SenTra for gerontechnology research and intervention. Gerontechnology 2010;9(2):156; doi:10.4017/gt.2010.09.02.087.00 **Purpose** Technology has been identified as an important means to serve and support older adults with cognitive impairment. Among the major functions of technology are compensating for memory loss, enhancing executive functioning including spatial and temporal orientation, providing safety and offering various forms of stimulation and activation. Against this background, this presentation serves to compile the SenTra findings and translate these to issues of application and intervention. **Method** Findings on tracking technology offered within the symposium will be set into a wider context of the existing research targeting technology, aging, and cognitive loss as well as gerontechnology issues at large. **Results & Discussion** Tracking technology imposed on older adults with cognitive impairment has found controversial discussion in recent research and application contexts. On the one hand, tracking has been characterized as violating ethical standards, because of its supervision and external control component, which may question the fundamental understanding of autonomous action. On the other hand, tracking technology may allow the exertion of rich out-of-home mobility, which would never be possible or a very risky enterprise for cognitively impaired elders without such technical support. What has research of the SenTra consortium to add to this controversy in terms of research and application? First, SenTra supports and qualifies the view based on a considerable sample size that tracking methodology works for older adults with various cognitive impairments. Second, tracking profoundly contributes to the better understanding of everyday life differences depending on the level of cognitive functioning, but also driven by other person and environment related variables. Third, both of these issues inform the use of tracking technology as a diagnostic tool, a safety means and an intervention platform.

References

1. Oswald F, Wahl H-W, Voss E, Schilling O, Freytag T, Auslander G, Shoval N, Heinik J, Landau R. The use of tracking technologies for the analysis of outdoor mobility in the face of dementia: First steps into a project and some illustrative findings from Germany. *Journal of Housing for the Elderly*; in press
2. Lindenberger U, Lövdén M, Schellenbach M, Li, S-C, Krüger, A. Psychological principles of successful aging technologies: A mini-review. *Gerontology* 2008;54(1):59-68

Keywords: out-of-home mobility, cognitive impairment, intervention, old age

Address: Heidelberg University, Institute of Psychology, Heidelberg, Germany;

E: h.w.wahl@psychologie.uni-heidelberg.de