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Numbers and narratives: Developing a mixed-methods approach to understand mobility in later life

Louise Meijering [a, *, 1], Gerd Weitkamp [b, 1]

[a] Population Research Centre, Urban and Regional Studies Institute, University of Groningen, The Netherlands
[b] Department of Cultural Geography, Urban and Regional Studies Institute, University of Groningen, The Netherlands

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ABSTRACT

The aim of this methods-focused article is to explore the potential benefits of integrating GPS, diary and in-depth interview data to gain richer insights into the everyday mobility practices of older adults. Eighteen adults, aged 65–90 years, living in the Netherlands, participated in the study. Our findings illustrate how quantitative (GPS) and qualitative (interviews and diary-based) approaches together can generate different insights and layers of understanding from each individual method in order to enhance the overall study findings.

Our findings demonstrate that our methodological approach generates new insights with respect to GPS-measured and self-reported mobility, time-geographies, and micro-geographies of older adults in the Netherlands. In conclusion, our mixed-methods approach contributes to a better understanding of the everyday mobility practices of older adults, and could be used in other demographic groups.

1. Introduction

Being mobile enables older adults to participate in meaningful activities, which in turn enhances their well-being (Nordbakke and Schwanen, 2014; Schwanen et al., 2012; Webber et al., 2010). The theoretical foundation for many studies on mobility is formed by Hägerstrand's time-geography (1970). This offers a useful framework for studying revealed activity and travel patterns, shaped by various constraints in space and time. In its earlier years the theory was developed at the micro-level, while its applications were zone-based (e.g. life space measures). This changed in the 1990s, when micro-level activity and travel data became available, as well as GIS techniques to manage and analyze these type of datasets. From then onwards, research has focused on the refinement of spatio-temporal, geocomputational techniques to describe measured or potential spatial movement of individuals (Buliung and Kanaroglou, 2006).

Time-geography has been criticized for its positivist characteristics, which come to the fore in its focus on objectively-measured revealed mobility without going further to explore people's perceptions and lived experiences of their everyday mobility patterns (Ellegård and Svedin, 2012). Much research on mobility is characterized by a focus on tracking mobility: measuring out-of-home mobility in terms of distances covered, speed of movement, and number of places visited (Almanza et al., 2012; Chan et al., 2014; Neven et al., 2013; Shoval et al., 2011). There is some, mainly qualitative, work on self-reported mobility, which focuses on people's perceptions of and satisfaction with their mobility (see Goins et al., 2015). However, much research either focuses on GPS-measured or (qualitative) self-reported mobility, and does not compare, combine or integrate the two methods. A notable exception is the work by Kwan and Ding (2008), which combined narrative analysis, qualitative GIS, 3D GIS-based time-geography methods, and computer-assisted qualitative analysis. More recently, work in which GPS tracking has been combined with methods such as qualitative GIS, in-depth interviews, walking interviews, travel diaries and participant-led photography, has emerged (Bell et al., 2015; Jones et al., 2011; Lord et al., 2009; Milton et al., 2015; Zeitler et al., 2012; Zeitler and Buys, 2015). These studies demonstrate that multiple research methods can enable a

* Corresponding author. Population Research Centre, Urban and Regional Studies Institute, University of Groningen, PO Box 800, 9700 AV, Groningen, The Netherlands.
E-mail address: l.b.meijering@rug.nl (L. Meijering).
[1] Both authors contributed equally.

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better understanding of the complex and various questions around the everyday geographies of mobility (Christensen et al., 2011).

The added value of the present study lies in the combination of GPS, travel diaries and in-depth interviews, applied to the theme of mobility and wellbeing with respect to older adults in the Netherlands. The aim of the present study was to explore the potential of integrating GPS, diary and in-depth interview data to gain insight into the everyday mobility practices of older adults in the Netherlands.

2. Methodology

2.1. Mixed-methods approach

Since our focus in terms of content was on older adults' everyday mobility practices in relation to their well-being, we adopted a convergent mixed-methods design (Creswell, 2009; Fetters et al., 2013). We used GPS-tracking, travel diaries and in-depth interviews for the purposes of triangulation and complementarity (Fielding and Fielding, 2008). The added value of this mixed-methods approach lies in how complementary and contrasting results from the different methods can be used to generate new insights, how different methods can be used to generate different layers of understanding, and how the results of one method can be used to inform the other method(s) (Tariq and Woodman, 2013).

There is an emerging literature in which GPS-based analytic approaches are used for different purposes capturing different aspects of mobility. In studies that focus on physical activity, GPS tracking is typically combined with accelerometer data. Such studies relate physical activity of, for instance older adults or adolescents, to the walkability of neighborhoods, park visits, and modes of travel such as commuting or school-travel, and public transport (Carlson et al., 2016; Chaix et al., 2014; King et al., 2011; Marquet and Miralles-Guasch, 2015; Stewart et al., 2016; Voss et al., 2014, 2016; Winters et al., 2015). Other studies use GPS tracking to measure activity space (Hirsch et al., 2014, 2016; Lee et al., 2016). Our study can be distinguished from those cited above insofar as we combined quantitative and qualitative methods, instead of using only quantitative methods. In so doing, we seek to combine GPS-measured mobility with self-reported mobility (see, for example, Kelly et al., 2013; Panter et al., 2014). The self-reported mobility in our study is based on in-depth interviews, and to a lesser extent on the diaries.

We first collected GPS data and travel diaries. Subsequently, in-depth interviews were conducted. We aspired to integrate the different methods through 'building' (Fetters et al., 2013). This means that for each participant, the results from the GPS data and diaries, in terms of places visited, purposes of travel, modes of transportation, and travel companions, informed the focus of the in-depth interview. The data collection was carried out by a research group led by the authors as senior researchers, and included nine third-year undergraduate students. The students collected the data, and the data-analysis was performed by the authors. GW took the lead in the analysis of the GPS data and travel diaries, and LM in the thematic analysis of the in-depth interviews. In the process, we continuously compared and integrated the emerging results from the different methods, through which we achieved a comprehensive analysis of the data.

2.2. Sampling

The research was conducted in the Netherlands among older adults, defined as 65 years and over. Data were collected in November and December 2014. The researchers recruited older adults through purposive sampling, using their own social networks and snowball-sampling. Purposive sampling is commonly used in qualitative and mixed-method research (Teddlie and Yu, 2007). Participants were asked in person, by email or phone to participate. Some people declined to participate, because of the time and effort required. We recruited eighteen participants, twelve women and six men, aged 65–90 years, all native Dutch. The different methods were connected through the sampling frame: each of the participants in our sample participated in all three research methods (Fetters et al., 2013: 2139). Half of the participants were part of the social network of one of the students. But participants were never interviewed by someone they knew personally.

2.3. GPS tracking

In our approach to GPS data collection and processing, we drew on Kerr et al. (2011). The participants were asked to carry a GPS tracker for eight consecutive days, whenever leaving their home. The aim of the GPS tracking was to record the participants' space-time patterns. We used the QStarz Travel Recorder BT-Q1000XT, which has relatively high accuracy, good signal acquisition time, battery life, and data storage, and is also easy to use (Schipperijn et al., 2014). Participants needed to press a power button to turn it off and on, and to make sure to charge it every night. The students delivered the GPS tracker in person to each participant, explained its use and asked participants to charge it every night. They also gave the participants an information sheet with instructions for use, to consult later if necessary. The first tracking day functioned as a trial-day, which was not included in the analysis. When problems with the use of the device were identified, they could be resolved during that day. For fifteen participants, at least seven consecutive days were recorded. For three participants, multiple days were not recorded, as they had forgotten to bring the tracker, turn it on, or recharge the battery.

The generated data consisted of the latitude, longitude, date and time, which were recorded every ten seconds. We used the GIS software V-Analytics to create a dataset with visited places and movements between those places (trajectories), the steps of which are shown in Fig. 1.

The white circles represent the registered GPS points (Fig. 1A). Each consecutive point was connected with a line, and a bounding box with a diagonal of 80 m (red boxes) was used to distinguish activities and trajectories (Fig. 1B). When GPS points were continuous in a bounding box for more than five minutes, an activity was created. The activities were used to split trajectories, and one or more activities at the same locations were clustered to create places (Fig. 1C). Various measures were calculated for each place and trajectory (Fig. 1D). We found V-analytics more useful to analyze space-time movement data, compared to standard GIS software packages (see, for example, Andrienko et al., 2013).

2.4. Travel diaries

During the eight days of GPS tracking, the participants were asked to keep a written travel diary, in which they recorded all out-of-home activities they engaged in. The aim of the diaries was to collect self-recorded mobility for comparison with GPS-measured mobility, and to collect additional data on each trip. Participants wrote down the time they had been away from home, the purpose of the activity, with whom they had been, and the modes of transportation they had used. Fourteen of the eighteen participants kept a diary. Reasons for not filling out the diaries were either that participants had difficulties remembering the activities they had engaged in, or that it took too much of their time.