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Access to public mobility services and health in old age: A cross-sectional study in three Swedish cities

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ABSTRACT

Background: Little evidence is available on how public transport features can impact on older people's health. The overarching aim of this paper is to evaluate socio-demographic, health and mobility-related factors correlated with health-related quality of life among people aged between 75 to 90 years old in three Swedish Municipalities.

Methods: Within the SEBEM study, a cross-sectional survey using a self-administered postal questionnaire was conducted among 2398 older people aged between 75 and 90 years. Primary outcome of the study was health-related quality of life measured using the SF12 which distinguishes two dimensions of health, i.e. the Physical Composite Score (PCS) and the Mental Component Score (MCS). Descriptive statistics were used to analyze the variability study outcomes. Multilevel regression models were used to investigate factors independently correlated with health, controlling for the influence of potential confounders.

Results: Higher physical and mental self-reported health is associated with walking more than 500 m on a daily basis, use of a private car and frequent engagement in social activities. Access to the car is only associated with physical health. Mental health scores are significantly lower among those living far from the closest bus stop and never using public transport.

Discussion: We provide evidence of epidemiological associations between access to public mobility services and good health in older age. Given the cross-sectional design of our analyses, and the related limitations, the associations found should be investigated more thoroughly by future studies using longitudinal and/or experimental designs.

1. Background

The acceleration of demographic ageing is one of the main challenges for European policy-making. As the baby-boom generation retires, the EU's active population will keep shrinking while the number of people aged over 60 will increase by about two million every year (European, 2010). Keeping this population active and healthy as long as possible should be the cornerstone of EU countries' policies and much research has been undertaken to promote older people's mobility and ability to actively participate in social life, in spite of functional or cognitive impairments (Risser et al., 2012; Risser et al., 2015; Lund et al., 2010).

On a European level, barriers to mobility among the aging population have been highlighted (Risser et al., 2010) and previous research has pointed out that for increasing the possibility to maintain everyday life mobility among older people, supportive environments (Ståhl et al., 2008; Sugiyama and Thompson, 2007; Mollenkopf et al., 2004) and social contexts are essential (Schwanen

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and Ziegler, 2011; Ziegler and Schwanen, 2011). An important factor for maintaining mobility in old age, which is often highlighted as a gender-related issue, is that of holding a driver's license or having access to a car (Rosenbloom, 1993; Rosenbloom and Winsten-Bartlett, 2002; Stjernborg et al., 2014; Melin Emilsson and Ståhl, 2016). In addition, a strong prerequisite for mobility in old age is access to public transport services (Transport, 2004; Svensson et al., 1998; Svensson, 2003; Ståhl, 1998). However, it is well-known that people with physical or cognitive limitations experience many barriers when using public transport, the most important being the distances to the system as such. This suggests that the whole travel chain from origin to destination (i.e. from planning the trip, the walk and distance to the bus-stop, the ride on the bus and the trip to the destination), should be considered when planning these services for older users (Ståhl, 1998).

Despite the well-documented importance of public transport services and options in determining the mobility patterns of older people, few epidemiological evidence have been made available on how public transport and mobility can ultimately impact on older people's health (Balcombe et al., 1997). On one hand, it is commonly accepted that increasing older people's overall travel opportunities can lead to their involvement in the community, thus improving their social ties and overall quality of life (Balcombe et al., 1997; Ståhl et al., 2013; Hallgrimsdottir et al., 2015). Evidence in the UK suggest that older people might be using free public transport options simply for social interaction purposes (Andrews et al., 2012). On the other hand, it is challenging to correctly estimate the individual and societal benefits of increased mobility using a holistic perspective of well-being, i.e. including both the physical, psychological and social dimension. In addition, no account seems to be taken so far regarding the benefits from community involvement or just from having the potential to travel. Likewise, up to date it is not possible to disentangle the reduction in quality of life that can be attributed to the loss of mobility, from the loss which is instead related to the onset of disability or the ageing process *per se* (Metz and Elsevier, 2000).

Clarifying the links between mobility and health is thus highly relevant, especially when considering the opportunity to invest in new or when reforming existing transport schemes. Traditionally, transport services for people with mobility and health problems have been identified in the so-called Special Transport Services (STS) model. STS are highly individualized and expensive mobility services available to eligible persons in different countries. STS permits are given after extensive evaluation of the person's ability to use the main-stream public transport service and tend to be more directed to wheel-chair users than older ambulatory people (Ståhl, 1998).

Recently, the idea that transport schemes specifically designed for older people can potentially be an incentive for generating additional trips among this population group has become more common. An interesting hypothesis following this idea is that intermediate, effective and efficient transport solutions (i.e. attractive for users and cost-efficient for society) may exist between the traditional public transport services and the STS. The use of a "travel chain perspective" in planning public transport options has thus generated new forms of flexible mobility services open to the general public but with focus on older people with the major goal being to shorten the distances to the services (Ståhl, 1998). Within this context, the so-called open Demand Responsive Transport (DRT) have emerged in the 1990s and onwards (Brake et al., 2006). The characterization of such services by Brake et al. Brake et al., (2006) shows a set of different options for "demand responsiveness" in Great Britain. Even if these new transport schemes have gained ground in some other European countries and in the US (Westerlund, 2016), it has not yet been tested in empirical settings whether enhancement of mobility in terms of public transport options has an impact on independent living large enough to reduce the overall burden of the society as a whole (e.g. through the reduction of home care services provided and medical care). This would be an extremely important evidence since it would justify (or discourage) further investments in the area of public transport.

The overarching aim of this paper is to study the relationship between perceived health and public mobility services. In more details, the paper aims at evaluating socio-demographic, health and mobility-related factors correlated with health-related quality of life among people aged between 75 to 90 years old in three Swedish Municipalities. The analysis aims to provide new evidence, which could inform the current debate in the area of transport planning.

2. Methods

2.1. The SEBEM study

The paper draws on data from SEBEM (Socio-Economic Benefits of Elderly Mobility), a study funded by the Center for Ageing and Supportive Environment (CASE) at Lund University (Sweden) with the aim to investigate several dimensions related to public transport use in old age. Aims of the SEBEM study included the evaluation of mobility patterns among people above 75 years old and related socioeconomic correlates and the analysis of the costs for mobility services provision among a number of selected Swedish municipalities.

2.2. Study design and study areas

Within the SEBEM study, a cross-sectional survey was conducted using a self-administered postal questionnaire in the cities of Lund, Helsingborg, and Gothenburg. The three cities have been selected as they represent urban contexts similar in terms of share of older population, but heterogeneous in terms of availability of mobility options. Particularly Gothenburg has invested considerably in the last 20 years in the development of Flexlinjen, an advanced flexible (demand-responsive) transport service for older people (Westerlund, 2016), which is absent in Lund and Helsingborg. In Gothenburg, we limited our study to selected city areas, i.e. Angered, Kortedala, Majorna, Linné, Örgryte, and Härlanda, in order to conduct further city-specific analyses in the future. These areas have been chosen to ensure a good representativeness of the Gothenburg urban area in terms of population socioeconomic

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