

Chapter 10

Mobility of the Elderly

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Abstract This chapter briefly overviews studies on mobility of the elderly with a particular focus on its conceptualization, measurement, and evaluation. The role of mobility in the everyday life of the elderly is first explored through putting mobility discourses into a broader context. After clarifying hierarchy of travel needs, interdependencies between mobility and other life domains, and the linkage between mobility and well-being are discussed. Then, policy aspects related to mobility of the elderly are examined, aiming to draw on the potential conflicts that exist among different perspectives including social welfare, economy, and urban planning. Finally, this chapter points out the needs for conducting further cross-cutting empirical studies, establishing a clearer linkage between conceptual framework and empirical framework, developing a simple and standardized method to collectively show the importance of social aspects of transport, and exploring the potential changes in the role or position of the elderly in future.

Keywords The elderly · Mobility · Achieved mobility · Capability approach · Hierarchy of travel needs · Well-being · Measure of achievement · Measure of freedom to achieve · Social exclusion

10.1 Introduction

It is widely known that mobility decreases with aging (Fobker and Grotz 2006; Rosenbloom 2004; Whelan et al. 2006). In response to this fact, a number of transport policies to maintain or improve the mobility of the elderly have been implemented, including the introduction of low floor buses, concessionary fares on public transport, and door-to-door public transport services (Broome et al. 2012;

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Metz 2003; Schmöcker et al. 2005). Meanwhile, it is also known that age is not just an indicator of the reduction of ability to travel (e.g., due to physical depression) but also an indicator of the reduction of travel needs (e.g., due to having less mandatory activities). This implies that the reduction of observed travel *itself* may not necessarily be linked with transportation issues. In some cases, the reduction of travel may be an issue of lacking opportunities to participate in social activities (Chikaraishi et al. 2013). This means it is important to make a clear distinction between *mobility* and *achieved mobility* in policy discussions: the former indicates the ability of the individual to travel,¹ i.e., what they can achieve, while the latter indicates the behavior they actually took, i.e., what they did. Policy focus could be substantially different depending on whether we focus on mobility or achieved mobility. For example, mobility may need to be explored when we focus on social welfare aspects of transportation, while achieved mobility may need to be focused on when we explore the economic impacts of transportation. However, such distinction has not been well made. In particular, a number of transport studies focusing on social welfare aspects have focused on achieved mobility rather than mobility, partially due to inherent difficulties in direct observation of mobility.

Another important aspect in discussing elderly mobility issues is about value judgments. We could consider that mobility *itself* has its own value, but a number of studies, especially from the viewpoint of land use and urban planning, emphasize the importance of looking at accessibility (i.e., the ability to access goods, opportunities, and services) rather than mobility. This is best reflected in the UK's social exclusion discourses (SEU 2003). On the other hand, some researchers emphasize that the value of mobility is more than the value of accessibility to some extent. For example, Rowe and Kahn (1997) emphasize that (1) low probability of disease, (2) high cognitive and physical functional capability, and (3) active engagement with life, are crucial for successful aging. From this viewpoint, a number of recent empirical studies show that mobility rather than accessibility is one of the main factors for successful aging as we will see later. In such a situation, it is becoming more and more difficult to establish a standardized policy evaluation criterion.

In this chapter, we attempt to give an overview of the current studies on mobility of the elderly with a particular focus on its conceptualization, measurement, and evaluation. We first explore the role of mobility in the everyday life of the elderly, through putting mobility discourses into a broader context: we focus on interdependencies between mobility and other life domains, followed by discussions on the linkage between mobility and well-being. We then introduce recent studies which attempt to distinguish mobility from achieved mobility. To characterize these two aspects, we adopt Sen's capability approach (Sen 1985). After

¹The definition of "mobility" can vary across disciplines. For example, Urry (2000), a sociologist, uses mobility in a broader context: the movement of not only people, but also things, information, and ideas. In this chapter, the term mobility is used just to simply indicate the ability of the individual to travel.

that, the issues on measuring the components of mobility are explored, together with the underlying evaluative aspects. Finally, we focus on policies on mobility of the elderly. We attempt to draw on the potential conflicts that exist among different perspectives including social welfare, economy, and urban planning, calling for cross-cutting approaches to mobility issues. We conclude this chapter with some reflections on future research agenda.

10.2 Mobility in the Management of Everyday Life

Having a better understanding of the role of mobility in the management of everyday life is crucial not just in formulating transportation policies but also in formulating other relevant policies including medical, social welfare, and economic policies. This section gives an overview on the role of mobility in old people's everyday life to understand the role of mobility from a broader perspective.

10.2.1 *Some Basics on Old People's Travel*

A large number of studies have been conducted to characterize old people's travel, where one distinctive aspect is age-associated disability. Impaired health is reported as a significant factor that reduces mobility through giving up driving (Rimmo and Hakamies-Blomqvist 2002). Also, vehicle availability and a driving license are known as important factors determining the level of mobility (Burkhardt et al. 1998; Kim 2011a), resulting in decreasing out-of-home activities (Davey 2006). The impacts of driving cessation on trip generation is extensive: according to a case study of Hiroshima City, around 0.25 trips per day would be reduced for those who live in high accessibility areas, and around 0.5 trips per day would be reduced for those who live in low accessibility areas by driving cessation² (Chikaraishi et al., forthcoming). It is also pointed out that such limited mobility could contribute to an increase in depressive symptoms (Marottoli et al. 1997, 2000).

Thus, development of accessibility strategies for old people who are no longer able to drive is one of the major concerns in the elderly's mobility discourse. The main option is to provide sufficient public transport services, but the use of public transport usually involves walking from home to the bus stop or rail station, requiring a certain level of physical ability (Metz 2003). Since driving cessation usually happens due to the reduction of physical ability, conventional public transport services may not really meet old people's needs to some extent.

²Note that the reduction of travel needs may also be reflected in the statistics.

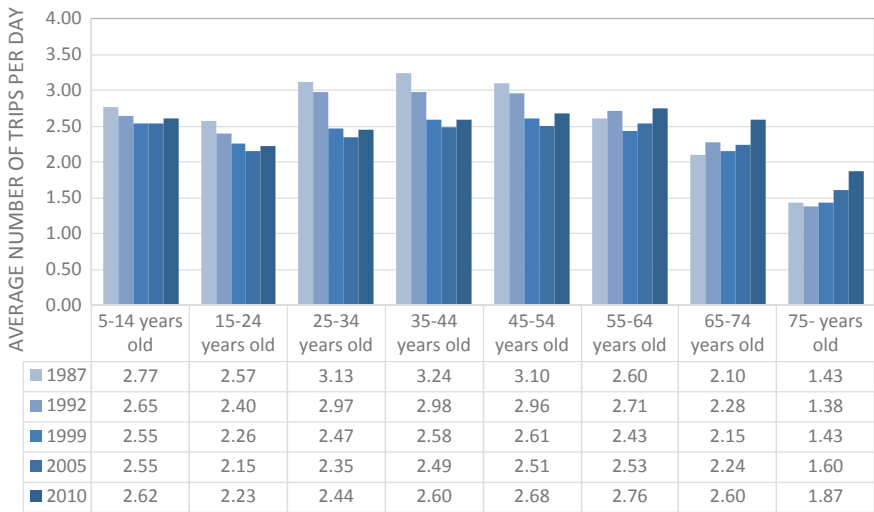
Existing studies show mixed results on the impacts of public transport availability on the level of mobility: some studies report the impacts are limited (Evans 2001; Schmöcker et al. 2008), while others show a significant importance (Fobker and Grotz 2006). Such gradation in the results could be partially attributed to the detailed design of public transport service. It is also shown that, even after driving cessation, transportation deficiency can be improved when they live within walking distance of places where activities are located (Kim 2011a). In this regard, providing mobility tools to support walking or replace walking by other means such as age-friendly vehicles could be an effective complementary policy option.

One important fact is that the number of active seniors in terms of the number of trips are increasing year by year on average. Figure 10.1 shows changes in the average number of trips per day by age in Japan. Clearly, the number of trips per day for those who are 65 years old or over has been increasing over the last two decades.

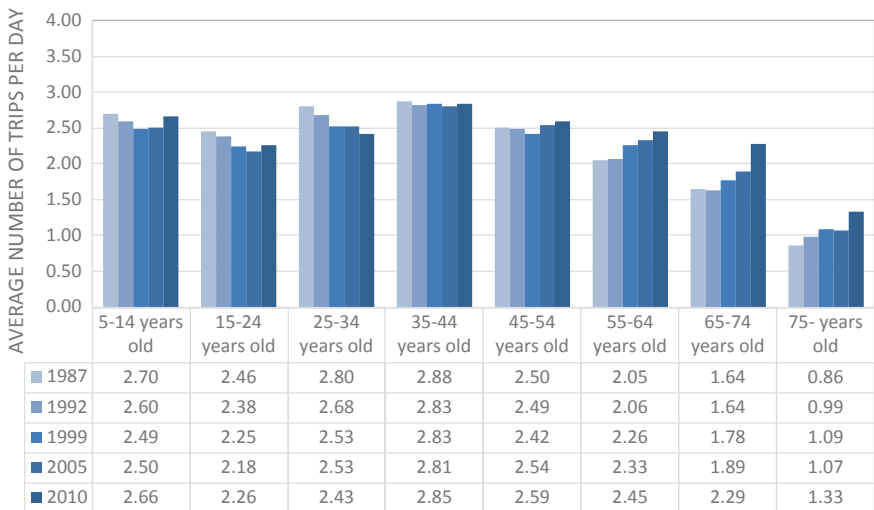
The reasons behind the increase in the number of trips made by old people have not yet been fully explored, but attention may need to be paid, at least, to the following two points: (1) the increase in travel needs for having basic social contacts and (2) the increase in old people who drive a car. The first point could be partially attributed to the trend toward nuclear families. It is known that maintaining a certain level of social relationships is crucial not only for keeping health conditions (Berkman 1995; Cohen 2004) but also for asking for help in case of emergency (Callahan et al. 1980; Dewit et al. 1988; Johnson and Catalano 1981). Traditionally these functions have been produced within a household, but this tends to be less possible with decreasing household size, potentially resulting in the generation of more trips. For the second point, Fig. 10.2 provides clear evidence that old people tend to rely on a car [while young male people show the opposite trend, which is consistent with Kuhnimhof et al. (2012)].

While a car is a vital source of mobility for the elderly, it is also known that the risk of traffic accidents could increase with aging (Blanchard et al. 2010; Eby et al. 2012; Hakamies-Blomqvist 1998; Keay et al. 2009; Matthews and Moran 1986). To overcome this issue, a number of actions have been taken to improve their driving skills, or to communicate with older drivers and their family members to shift from a car to other modes of travel (Ball et al. 1993; NHTSA and ASA 2007; Odenheimer et al. 1994; Owsley et al. 1991, 1998; Ross et al. 2009). However, policy interventions on driving cessation are becoming increasingly sensitive, particularly for those who heavily rely on the use of a car (Musselwhite and Haddad 2010). It would partially be induced by car-oriented land use patterns (Adams 1999).

The above mentioned current trends show that old people's travel behavior have changed both quantitatively and qualitatively. In particular, current old people are more familiar with car use and the impacts of car cessation would be much higher than for old people from the past. Such changes may affect policy decisions in various ways, calling for further understanding of their travel needs.



(a) Male

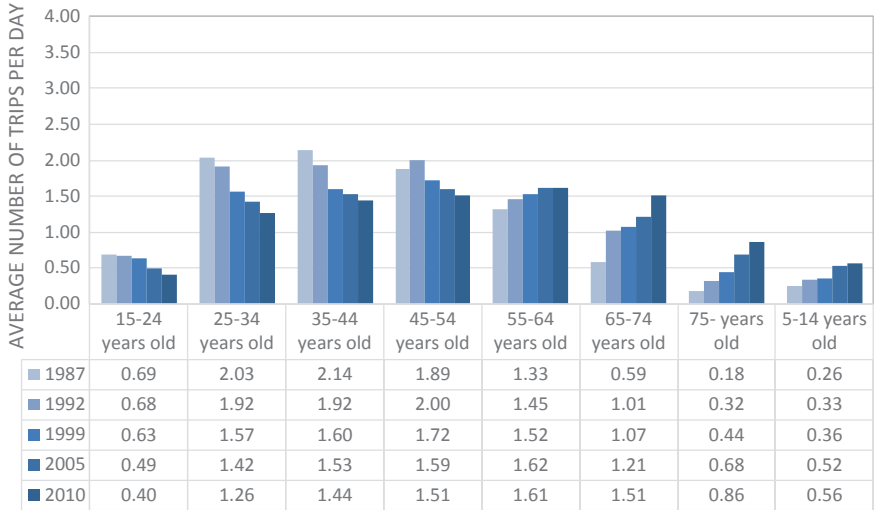


(b) Female

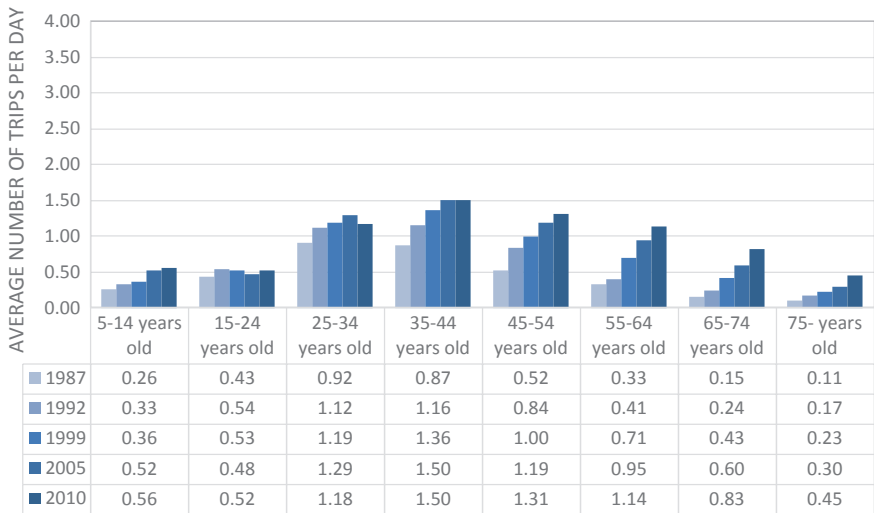
Fig. 10.1 Average number of trips per weekday by age. Data source: Nation-wide person-trip surveys (conducted by the Ministry of Land, Infrastructure, Transport and Tourism in Japan)

10.2.2 Hierarchy of Travel Needs

One fundamental question that needs to be further explored is why old people need to be mobile. The minimum answer is to satisfy the basic needs, including access to healthcare, food, water, clothing, and so forth. These are the minimum



(a) Male

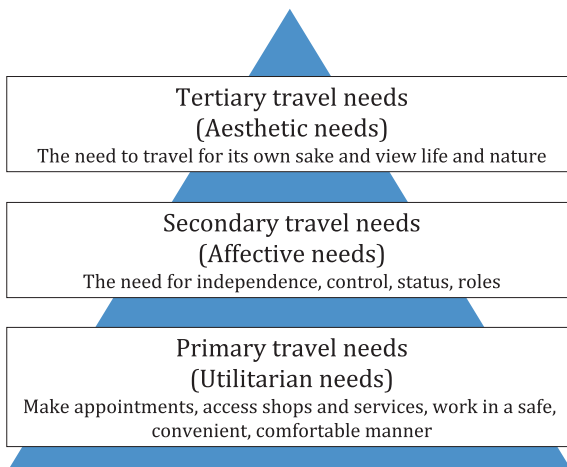


(b) Female

Fig. 10.2 Average number of car trips per weekday by age. Data source: Nation-wide person-trip surveys (conducted by the Ministry of Land, Infrastructure, Transport and Tourism in Japan)

resources necessary for physical well-being. On the other hand, the target of transport welfare policies is often not just for basic needs, but for a higher level of needs. To conceptually understand the needs at different levels, the hierarchy of mobility needs proposed by Musselwhite and Haddad (2010) is useful. Figure 10.3

Fig. 10.3 Hierarchy of travel needs (Musselwhite and Haddad 2010)



shows Musselwhite and Haddad’s hierarchy of travel needs, where so-called utilitarian needs, affective needs, and aesthetic needs are distinguished.

The primary level is utilitarian needs which consider people are traveling for an activity engagement at a destination, such as medical care at hospital or shopping at a supermarket. Though it is arguable as to what kinds of facilities should be able to be accessed to maintain a minimum living standard, this level of travel needs are directly linked with the access to basic needs. At this level, the main focus is to achieve the things they want to do at the destination, rather than traveling itself. Thus, for example, if the purpose is to get a certain food, there would be no distinction between getting it through traveling to a supermarket and getting it through a home-delivery service or even asking somebody to buy it. This type of travel needs has been intensively discussed in both practical and academic works (Kenyon et al. 2002; SEU 2003; Trinder et al. 1991).

The secondary level is affective needs, concerning whether or not one can control his or her own life. This type of need is more than accessibility in the sense that it links travel with psychological well-being associated with feeling part of society, identity, status, and roles. For example, though a shopping trip could be replaced by a home-delivery service if the purpose is to get some goods, this could lead to significant psychological issues such as feelings of depression. If we consider such aspects in policy debates, the needs for travel is going beyond the conventional accessibility needs (Marottoli et al. 1997).

The highest level is aesthetic needs, where the main concern is in access to aesthetics rather than to a practical good or service. Aesthetic needs are at the highest level in the sense that such needs are not really linked with survival and completion of ordinal tasks but rather linked with the quality of life. In the transportation field, the importance of enjoying traveling has been discussed in a number of existing literature (Mokhtarian and Salomon 2001), but it has been less focused in the analysis of old people’s travel. Exploring aesthetic needs could be important,

for example, to increase active seniors who could positively contribute to economic outcomes, and, in this case, the highest level of travel needs may appear in policy agenda.

Such hierarchical views on travel needs provide a useful insight to transport policy discussions: To what extent do governments have to take care of affective and aesthetic needs in formulating policies, and to what extent do they need to ensure the basic mobility that allows old people to survive and complete ordinal tasks? If the highest priority is on ensuring basic mobility and little attention is paid to the higher mobility needs, would social isolation and psychological depression be more serious? If so, would it result in increasing medical and care needs, and/or decreasing economic outcomes? Answering these questions is crucial in policy decisions, yet we do not have enough evidence. Some useful information related to such policy decisions could be obtained by looking at existing studies exploring interdependencies between mobility and other life domains.

10.2.3 Interdependencies Between Mobility and Other Life Domains

It is clear that mobility and other life domains are not independent of each other. Changes in the level of mobility would influence decisions on other life choices such as residential location, daily social contacts, and leisure activity engagement. At the same time, other life domains also affect the level of mobility. For example, health condition would determine their walking ability, residential location would determine the accessibility to public transport, and household income would be the main factor affecting the availability of personal vehicles. Thus, mobility issues may not be able to stand independently from other life domains.

Though a huge number of life domains would be linked with mobility issues, one of the critical life domains would be social engagement (including paid and unpaid work) that contributes to having an active life and reduces not only physical but also social and mental health risk. There is a two-way interaction with mobility, adding a certain difficulty when taking into account these aspects in formulating transport policies.

The importance of engagement in work has been pointed out in a number of studies. Here, work may not need to be paid but could be any kind of *productive social engagement* such as volunteering, care of family members, and informally helping friends. Existing studies show that old people who are actively engaging in productive social activities tend to remain economically active, and show better health and well-being (Curran and Blackburn 2001; Hao 2008; Siegrist et al. 2004). Whether the elderly can live such an active life or not would depend at least first on (1) whether or not they have the opportunity to be active (i.e., lack of activity opportunities), and second on (2) whether or not they have enough mobility to participate in the activity (i.e., lack of mobility). Chikaraishi et al. (2013)

conducted a small empirical study to identify which factors have larger impacts on social engagement and conclude that a lack of activity opportunities, rather than mobility, would be a main factor in hindering the elderly from active engagement.

The benefit of maintaining health is discussed not only from the viewpoint of reducing medical cost particularly from the viewpoint of active life expectancy (Katz et al. 1983; Lubitz et al. 2003) but also from the viewpoint of reducing caregivers' burden. In fact, many studies show that caregivers are most likely to experience problems with mental health and social participation (Chikaraishi et al. 2012; George and Gwyther 1986; Schulz and Beach 1999; Sisk 2000; Wiles 2003). Since the number of old people who need care are dramatically increasing [for example, the number of people who require nursing care has risen dramatically in recent years in Japan: 2.88 million people in 2001 and 4.25 million people in 2006 (Cabinet Office in Japan 2009)], the benefit of maintaining old people's health could be very high, and supporting mobility may be an important policy option toward that purpose (NHTSA and ASA 2007).

Once people cannot maintain a certain level of mobility, this could be a stimulus for changing residential location. Existing studies show that elderly households tend to move from less urbanized areas to slightly more urbanized areas (Kim 2011b) partially for better urban amenities (Speare and Meyer 1988). Also, it is pointed out that living in areas with high access to activity locations within walking distance or to well-developed transportation systems could contribute to an active life (Burkhardt 1999; Kim 2011a). In this sense, increasing residential mobility could be a powerful policy option for responding to driving cessation. On the one hand, it is found that the majority of old people live in low-density suburban areas (Chikaraishi et al. forthcoming; Kim 2011a), and residential relocation to more urbanized areas to substitute the loss of driving is not really an option for most of the elderly (Rosenbloom 2009). Urging old people to substitute the loss of driving through residential relocation needs further understanding of the residential relocation decisions taken by the elderly.

10.2.4 Mobility and Well-Being

Studies exploring the connection of mobility with well-being and quality of life has been increasing recently (Abou-Zeid and Ben-Akiva 2011; Banister and Bowling 2004; Ettema et al. 2010; Metz 2000; Mizokami et al. 2014; Musselwhite and Haddad 2010; Spinney et al. 2009). It is confirmed that active engagement of leisure activities has a positive relationship with morale, self-esteem, and self-rated perceptions of health (Misra et al. 1996; Patterson and Carpenter 1994), and thus promoting active life through enhancing mobility could be an important policy option, especially in an aging society.

Similar to Musselwhite and Haddad's (2010) assertions, Metz (2000) points out that existing analysis of travel demand and supply, focus only on benefits from

improving accessibility and does not consider the so-called *destination-independent benefits*, including (1) psychological benefits, (2) exercise benefits, (3) involvement in the local community (yielding benefits from informal local support networks), and (4) potential travel (knowing that a trip could be made even if not actually undertaken). Currie and Stanley (2008) investigated such destination-independent benefits from the viewpoint of social capital. On the other hand, these studies that emphasize the importance of exploring destination-independent benefits also show difficulties in executing quantitative analysis and evaluation. Actually, we have a quite well-established evaluation tool when our objective is to minimize the generalized cost of travel (which is consistent with the microeconomic theory), but we do not really have a standardized evaluation method for destination-independent benefits. In response to this, alternative frameworks, which could take into account destination-independent benefits, have been proposed for example based on the concept of subjective well-being (Ettema et al. 2010). Meanwhile, it is known that subjective evaluation can be biased. One possible reason is that people would be reluctant to describe themselves as socially excluded (Preston and Rajé 2007). Also, it is observed that the elderly show a higher satisfaction with their current living environment and their mobility level than others (Fobker and Grotz 2006). In this sense, a subjective well-being approach has its own limitations. Nordbakke and Schwanen (2014) give an overview from a broader perspective: they explore the links between well-being and mobility under 10 different approaches to well-being (utility approach within economics, subjective well-being approach within psychology, eudaimonic approach within psychology, the basic needs approach, the resource approach, the integral needs approach, capability approaches, health-related quality of life, lay views, and an ecological approach). This study gives a clear summary on the conceptual linkage between well-being and mobility, but measuring and evaluating mobility and well-being remain unsolved issues, which are crucial for evidence-based policy decisions. In the next two sessions, we discuss the measurement aspects of mobility which involves the issues of evaluating mobility.

10.3 From a Measure of Achievement to a Measure of Freedom to Achieve

As we discussed in the Introduction, mobility and achieved mobility are different. Before reviewing existing measures of mobility, it would be better to clarify the differences between these two aspects in a conceptual way.

Mobility and achieved mobility could be distinguished by applying Amartya Sen's capability approach (Sen 1985). Figure 10.4 illustrates the concept of the capability approach. One of the core ideas of the capability approach is to make a clear distinction among the following three aspects: (1) the means

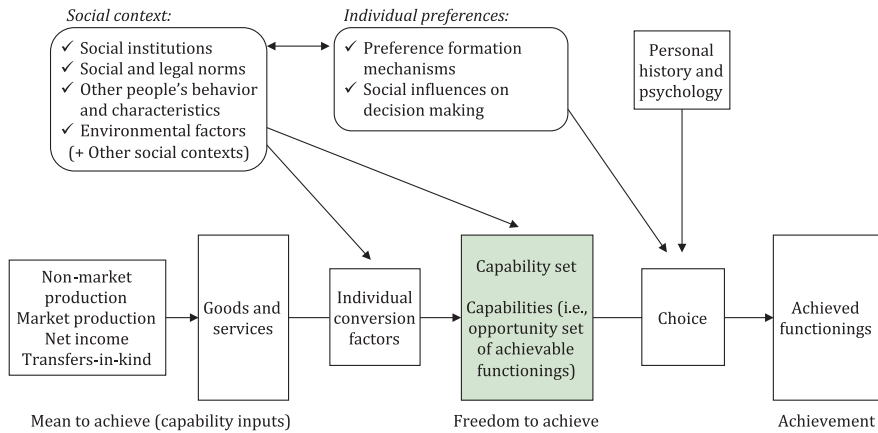


Fig. 10.4 Conceptual illustration of the capability approach (Robeyns 2005)

(i.e., commodities which would be used to achieve functionings³), (2) achievable functionings and capabilities (i.e., what people are effectively able to do and be), and (3) achieved functionings (i.e., outcomes such as what they did). Though all aspects could be used in policy evaluations, Sen argues that policy evaluations should focus on the second component, rather than the first and third components.

In mobility discourse, the first component would, for example, include car and bicycle ownership and the living environment such as distance to a bus stop and train station. In practice, these are widely used as proxy measures of mobility. The third component would, for example, be the number of trips made by car, bicycle, and public transport, which are also used as measures of mobility. Subjective outcomes such as subjective well-being could also be a part of the third component. Given the above first and third components, the second component may be simply defined as the ability of travel or mobility. The importance of focusing on the second component, i.e., achievable functionings, is obvious in discussions of the elderly's mobility issues. The first component may overlook the heterogeneity of physical ability among old people. For instance, the distance to a bus stop, some of the elderly may feel it is too far to walk there while others may not. One potential issue of the third component is that it reflects not only mobility but also travel needs, as we discussed in the Introduction. The number of trips made is not solely determined by the ability of travel. Thus, *if* our goal is to improve mobility, it should be understood that the first and third components are proxy measures which are potentially biased.

³The term “functionings” is used in Sen’s (1985) work, where it means “what the person succeeds in *doing* with the commodities and characteristics at his or her command (p. 6)”, or simply “what he or she manages to do or to be (p. 7)”. Commodities will be used to achieve the functionings, while the achievement would be different across individuals even with the same bundle of commodities, since the ability to use the commodities are different.

Note that it is arguable whether or not the improvement of mobility is the ultimate goal of transport policies. For example, we know that too much private mobility can reduce social welfare as a whole through environmental degradation, adverse public health impacts, high accident rates, declining public transport, changes in land use and community severance (Preston and Rajé 2007). In this sense, too much emphasis on mobility needs may not be appropriate in public policy discussions. Rather than simply focus on the mobility level, the policy goal should be carefully designed in paying attention to the broader context. For example, SEU (2003) argues that accessibility rather than mobility should be the primary goal of transport policies. In this case, mobility may be understood as a means to achieve a certain level of accessibility. From this perspective, utilizing information and communication technology (ICT) tools (Kenyon et al. 2002), land use policies (Fobker and Grotz 2006), home-delivery services (Taketa et al. 2011), and residential relocation (Kim 2011a, b) could be alternative options in overcoming mobility issues. On the other hand, once we put more importance on affective and aesthetic mobility needs in policy debates, the role of mobility may be more than accessibility. Which viewpoint should be employed is a kind of normative question which may need to be answered partially through public debates (and of course through more solid theoretical/empirical analyses from a comprehensive viewpoint). We will come back to this point in Sect. 10.5. Under any normative judgments, we could say that at least the (ideal) ultimate goal of transport policies needs to be clarified before selecting evaluation measures for more informed policy decisions.

Note that a number of studies have recently utilized the capability approach in transportation policy discussions, but the ways in utilizing the capability approach can vary (Beyazit 2011; Eitoku and Mizokami 2010; Ryan et al. 2015; Smith et al. 2012). For example, travel can itself be a valuable functioning in a certain context (Nordbakke and Schwanen 2014), although it would not always be applicable. It should also be noted that achieved mobility, rather than mobility, needs to be focused on, depending on the goal of the analysis. For example, when we want to explore the economic impacts of transport policies, the number of trips actually made might be an important indicator of economic activities, rather than its potential. In summary, the capability approach would provide a useful framework for conceptualizing mobility issues, but it would not provide any normative judgments on the needs for mobility (Sen 2009). Another important note is that there would be some room needed for operationalizing the capability approach for practical use, which is common to other applications in different fields (Comim 2008; Lelli 2008; Raid el Mabsout 2011). Especially, as it is known that capability is, in general, not directly measurable. We will focus on this point in the next section.

10.4 Measuring the Components of Mobility

Even when one considers that mobility rather than achieved mobility needs to be focused on in policy debates, one would face difficulty in observing them, as we mentioned above. The data requirements for the operationalization of Sen's

capability approach are heavy and the information required for its full implementation may not be available in general (Papadopoulos and Tsakloglou 2008), and thus, it would be rational to use proxy measures, such as car ownership and the number of trips the elderly made in practical contexts, in order to avoid the extreme cost of collecting the full information.

Table 10.1 summarizes some of the existing studies measuring the components of mobility. In the table, we also show the main aims for the improvement of mobility, since the selection of the measures would depend either explicitly or implicitly on the value of judgments the authors made. Although the table just shows selected studies from those that exist, there are a number of interesting observations as summarized below.

Firstly, it can be confirmed that existing indicators to measure mobility vary across case studies, indicating that there would be no standardized indicator for measuring mobility. As expected, from the viewpoint of the capability approach, it can be said that most of the indicators focus on mobility resources (e.g., car availability, public transport availability, and support networks) and/or achieved mobility (e.g., the number of trips and activity participation), rather than achievable functionings and capability. This is presumably due to the issue of observability, as mentioned above. Achievable functionings and capability are not in physical space, while mobility resources and achieved mobility are. On the other hand, some researchers make an effort to use better proxy indicators to reflect achievable functionings and capability. For example, Ryan et al. (2015) explore the achievable capability (called *mobility capability* in their paper) by observing the perception of the possibility to use public transport. Smith et al. (2012) extract the minimum requirement for mobility through a focus group. Nordbakke and Schwanen (2015) focus on the level of unmet needs for out-of-home activity. Actually, there is a growing body of literature which utilizes the capability approach to conceptualize and characterize mobility, and the above mentioned studies are doing this too.

It can also be confirmed that there is a trend to evaluate the mobility improvement in a broader context, by applying the concept of quality of life, social inclusion, and well-being. These are quite important to comprehensively capture the social impacts of transport policies. However, the evaluation results are still not comparable since the measurement unit is not standardized. One exception is the work of Stanley et al. (2011a). They attempt to monetize the value of mobility from the view of reducing the risk of social exclusion. Such monetary valuation is very powerful to put mobility discourses into much wider policy discussions where mobility and other policy options in other various sectors need to be compared.

Another interesting finding is that indicators to observe mobility do not correspond one-to-one with indicators to evaluate mobility, but there exists a certain trend. First, the use of subjective indicators in evaluating mobility has become more and more dominant, with the recent progress of theoretical works on how mobility is linked with well-being, social inclusion, and quality of life. Though this may be partially because of preferences to use subjective indicators, it is mainly because most objective indicators could not directly meet the basic requirements of the recent theoretical works. In other words, we simply do not have better objective

Table 10.1 Some empirical studies on the measurement of mobility

Authors	Study area	Travel mode covered	Main aim for improving mobility	Indicator to measure mobility	Indicator to evaluate mobility	Note
Burkhardt (1999)	US	Car	Reducing monetary, social, psychological, and mental health costs	Car availability, number of trips	Not specified (but a number of categories of indicators are shown)	Summarizing possible consequences of reducing or ceasing driving comprehensively
Marottoli et al. (2000)	New Haven, US	Car	Including but not limited to maintaining health	Car availability	Participation in out-of-home activities	The paper found the negative effects of driving cessation, i.e., decreases in out-of-home activity levels
Alsnih and Hensher (2003)	Western countries	All modes	Ensuring mobility and accessibility needs	Car availability, public transport availability, availability of support networks, residential location (amenities)	Need-based evaluation (not empirically examined)	The paper emphasizes more flexible forms of transport are needed as many seniors are seeking more flexibility in their transport services
Fobker and Grotz (2006)	Bonn, Germany	All modes	Enabling a self-determined life	Revealed travel behavior (mainly for shopping and leisure activities)	Gap between mobility and living environments (Seeking appropriate living environments)	The paper investigates which living conditions best meet the needs of elderly people, and shows the importance of the basic facilities and public transport services within the residential environment

(continued)

Table 10.1 (continued)

Authors	Study area	Travel mode covered	Main aim for improving mobility	Indicator to measure mobility	Indicator to evaluate mobility	Note
Preston and Rajé (2007)	UK	All modes	Social inclusion (conceptualized by Sen's entitlement theory)	The level of travel in the area as a whole (area mobility), the level of travel made by particular individuals or groups (individual mobility)	Not specified (based on a matrix of area accessibility, area mobility, and individual mobility)	The paper emphasizes the importance of exploring mobility and accessibility issues at the disaggregate level
Spinney et al. (2009)	Canada	Travel is not directly dealt with	Quality of life	Mobility is not directly measured	Voluntary time outside home (as psychological benefits of mobility), sports and active leisure outside home (as exercise benefits of mobility), and community-helping and community-socializing time budget (as community benefits of mobility)	Results exhibit significant variations in transport mobility benefits by life situation and subjective well-being indices, and also indicate significant association between transport mobility benefits and quality of life. The measures used are developed from Metz's (2000) work
Musselwhite and Haddad (2010)	South West of England	Car	Quality of life	Car availability	Self-reported quality of life	The paper concludes that when older people give up driving, their self-reported quality of life is reduced which may be related to a reduction in affective and aesthetic qualities of mobility

(continued)

Table 10.1 (continued)

Authors	Study area	Travel mode covered	Main aim for improving mobility and accessibility needs	Indicator to measure mobility	Indicator to evaluate mobility	Note
Kim (2011a)	US	All modes	Ensuring mobility and accessibility needs	Car availability, residential location, support networks	Subjective transportation deficiency	The paper points out that, in suburban areas, rather than the availability of public transport services, the placement of activity locations within walking distance would be more important in reducing transportation deficiency
Stanley et al. (2011b)	Melbourne and the Latrobe Valley, Australia	All modes	Improving well-being	Number of trips	Subjective well-being	The paper found that a lower number of trips lead to lower subjective well-being. The linkage between number of trips and well-being is assumed to be mediated by the risk of social exclusion
Smith et al. (2012)	UK	Public transport, taxi and car (in rural areas)	Capability for achieving a minimum living standard given typical accessibility conditions	The minimum requirement on mobility is set based on a focus group	Type and number of trips required to meet a minimum living standard (defined by focus group)	The main focus of this study was to identify the additional costs faced by rural households in order to achieve the same living standards as urban households. Sen's capability approach is used for conceptualization. The focus is relatively short-term in the sense that residential relocation is not considered

(continued)

Table 10.1 (continued)

Authors	Study area	Travel mode covered	Main aim for improving mobility	Indicator to measure mobility	Indicator to evaluate mobility	Note
Nordbakke (2013)	Oslo, Norway	All modes	Ensuring capability (defined as opportunities for mobility)	Not specified (based on focus group)	Not specified (based on focus group)	Based on four focus groups, they found that resources, contextual factors, and strategies are intertwined, which collectively form a “pool of capabilities for mobility”
Nordbakke and Schwaben (2015)	Norway	All modes	Well-being	Driving license, distance to public transport subjective evaluation of public transport, residential location, etc.	The level of unmet needs for out-of-home activity	Exploring factors affecting unmet needs for out-of-home activity
Ryan et al. (2015)	Stockholm, Sweden	Public transport	Not clearly mentioned but ensuring mobility (as part of capabilities)	The perception of the possibility to use public transport (mobility), the actual use of public transport (achieved mobility)	No specified (mobility capability)	Mobility and achieved mobility are distinguished by applying the capability approach

indicators (or the observation is too expensive) to fully reflect theoretical thoughts. As we discussed above, it is widely known that subjective measurements can be largely biased, particularly because elderly people eventually adjust their expectations to the reality of their situations (Fobker and Grotz 2006; Gasper 2007). If this is the case, subjective indicators would reflect personal standards, which is an undesirable property of indicators in making public policy decisions. To overcome this issue, some researchers recently use objective indicators or some other ways to extract objective mobility needs. For example, following the work of Metz (2000), Spinney et al. (2009) focus on time used to evaluate the transport mobility benefits. Smith et al. (2012) conducted a focus group to identify the minimum requirement on mobility rather than focusing on personal needs.

In summary, at this moment, we do not have a standardized method to measure and evaluate mobility from the viewpoint of social aspects of transport. It is clear that having a standardized method would be helpful to collectively emphasize the importance of the focused aspects in developing policy agendas. On the other hand, the use of the standardized method could potentially lead to misunderstanding the local context or crudely deal with context-specific issues. This is analogous to the traditional economic evaluation of mobility to some extent: while the conventional cost-benefit analysis provides a powerful rationale for taking the corresponding policy action, the local context is often not considered due to the systematic application of the established method. The locality could be more important not just because of the differences in the environment but also because of the differences in norms that the residents have. Different value judgments would lead to different criteria to select the measurement of mobility. In this sense, the selection of indicators depends on the focus to some extent which is largely affected by policy discussions. We will see this point in more detail in the next section.

10.5 Policy Goals on Mobility of the Elderly

Transport policies for the elderly often have multiple objectives. First, ensuring mobility and accessibility for social security and welfare has been considered one of the most important policy goals. In particular, declaration of a general right to transport in France was established in 1982, practical policy discussions on transport-related social exclusion issues in the UK and Australia, and the Basic Act on Transport Policy in Japan are closely linked with policies for social security and welfare (Lucas 2011; Stanley 2011). These policies may correspond to actions that ensure primary travel or utilitarian needs in the hierarchy of travel needs shown in Fig. 10.3. One key question from this perspective is how to define the minimum living standard which needs to be ensured through policy intervention, and what role transport has in ensuring the standard.

Particularly after the emergence of social exclusion discussions in the UK (SEU 2003), the role of mobility in ensuring social security and welfare has been clarified in detail. SEU (2003) notes “improving transport is not the only way to

solve the ‘accessibility deficits’... Over the medium- to long-term, improving local service delivery in the places where people experiencing or at risk of social exclusion live may provide a more cost-effective solution in some cases (p. 60)”. From this viewpoint, in some cases mobility improvement may be able to be replaced by the use of ITC tools (Kenyon et al. 2002), and the improvement of living environment (Fobker and Grotz 2006; Kim 2011b), indicating that ensuring mobility itself would not be a primary goal of transportation policies. In other words, these focus on the right of accessibility rather than the right of mobility (Farrington 2007).

The rationale for focusing on accessibility rather than mobility is further supported by the argument of the adverse effects of mobility improvement on urban form. This is best described in the seminal work of Adams (1999): “When people acquired cars their activity patterns were transformed. They began going places previously unreachable by public transport, and travelling at times when public transport did not run. Over time, as more people acquired cars, land use patterns responded. Retailers began locating out of town for the convenience of motorists. Residential developments moved to the suburbs where there was room for garages and off-street parking. Offices moved to out-of-town business parks surrounded by car parks. And hospitals, cinemas, post offices, and warehouses all became bigger and fewer in number, and more difficult to reach by foot, bicycle or bus (p. 110)”. Urry (2000) also notes that a higher requirement for mobility may result in forcing people to have a higher mobility. A number of existing studies that consider transport policies from the perspective of urban planning repeatedly emphasize that enhancing mobility could ultimately result in forcing people to have a higher mobility to satisfy basic needs. Presumably in response to such debates, some studies focus on the residential location and the living environments when exploring mobility issues (Kim 2011b).

In the meantime, as we discussed in Sect. 10.2.2, the value of mobility is sometimes considered to be more than the value of accessibility (Metz 2000; Banister and Bowling 2004; Spinney et al. 2009; Musselwhite and Haddad 2010). This is particularly true when the impacts of mobility on quality of life is the primary interest. A number of studies have confirmed that the reduction of mobility may hinder them from participating in social and leisure activities, while the minimum level of access to basic needs such as goods and health care may be maintained. One important policy question is whether policy makers should ensure not just the access to basic needs, but also the access to higher level needs such as loving, belonging, and self-actualization. Though ensuring higher level needs seem to be too much work for the government, there are some plausible reasons for it. First, it is known that satisfying higher level needs could sustain active life (Burkhardt 1999; Marottoli et al. 1997, 2000), which could contribute to increasing economic outcomes as well as reducing medical costs. One possible consequence from this viewpoint would be to help the older population keep driving as long as they can (Kim 2011a), which actually conflicts with the logical consequence from the perspective of urban form mentioned above. In this sense, a cross-cutting approach, including transport, economic, health, and urban form, is necessary to adequately

formulate mobility policies. In other words, the value judgment cannot be made based solely on transportation aspects.

Such conflicting views among researchers/disciplines may be one of the major difficulties for policy decisions in a practical context, which is linked with a traditional question in sustainability discourse, i.e., how to give an appropriate weight in policy decisions to the future and the present. On the one hand, for the elderly to keep driving as long as they can, is an attractive policy option from the short-term viewpoint. On the other hand, transportation researchers and urban planners seem to generally recognize that too much private mobility can reduce social welfare as a whole through environmental degradation, adverse public health impacts, high accident rates, declining public transport, changes in land use, and community severance (Preston and Rajé 2007). Such short-term and long-term impacts need to be taken into account in the process of transport policy decisions. Unfortunately, the current policy evaluation frameworks which mainly focus on *marginal* changes in mobility. Rather than exploring the marginal changes, maximizing long-run social welfare under a certain equity constraint would need to be considered. As mentioned above, we do not have a well-established standardized method to evaluate such transport policy impacts. Though there is a certain need to set some context-dependent benefit items in policy evaluations, a standardized policy evaluation tool would be worth developing to give a solid basis for comprehensive policy evaluations on the mobility of the elderly. A standardized tool would also be helpful in comparing mobility conditions across different areas and different social groups, as well as to compare the impacts of transport policies with those in other sectors such as medical and economic. The comparison is essential, since in general resource allocation issues under a certain budget constraint (either across regions or across sectors within a region) need to be considered in policy decisions in a practical context. This is particularly true when the number of the elderly is rapidly growing, like in Japan.

10.6 Conclusions

This chapter gave a brief overview on mobility of the elderly, with a particular focus on its conceptualization, measurement, and evaluation. One clear trend is the recent expansion of the scope. Though mobility of the elderly has long been discussed with consideration of health domains, the scope further expands to put mobility into broader discourses, including social inclusion, quality of life, and well-being, contributing to a comprehensive understanding of social aspects of transport. This has also led to the development of various conceptual frameworks and measurement methods, where a number of different goals have been employed. For example, on the one hand, one can consider the ultimate goal of transport policies for the elderly is to fulfill their desires and preferences, which could minimize social exclusion and maximize the subjective well-being. On the other hand, one can consider the goal is to ensure access to basic needs rather than

fulfilling their desires, which would efficiently reduce disparities across different social groups. One of the major difficulties arising from the expansion of the scope is in accommodating such different concepts and goals. As we have shown, existing studies generally show that, ensuring mobility would be a plausible policy direction from the perspective of fulfillment of desires and preferences, while ensuring accessibility would be a plausible policy direction from the perspective of fulfillment of basic needs. Clearly, such conflicting views need to be overcome to make an appropriate policy decision. To do this, further cross-cutting studies, where insights from different traditions are integrated and sublated, are necessary. The following are some research recommendations toward it.

First, further cross-cutting empirical studies which have well-established theoretical foundations are needed. As we discussed in this chapter, there is a growing body of literature which considers multiple facets of mobility of the elderly, but evidence is quite limited. For example, it is not clear how active social participation in later life contributes to the reduction of medical costs and caregivers' burdens, and to what extent transport influences this relationship, calling for cross-cutting studies which would involve researchers in the fields of transportation, economics, social science, and medical science. We also do not really know how experiences in earlier life would affect the mobility needs in later life and hence their well-being, calling for the needs of life-course studies. Second, a much clearer linkage between conceptual framework and empirical framework needs to be developed. More concretely, a clear distinction among the aim or goal of mobility improvement, an indicator to measure mobility, and an indicator to evaluate mobility is important to smoothly link theoretical and conceptual discourses with empirical works. This would provide a clear picture as to what extent theoretical thoughts are embedded into empirical analysis, and the potential of involving errors largely associated with imperfect information which is needed to fully describe theoretical thoughts. Third, from the practical point of view, we may have to consider how to put social aspects of transport into policy agenda. For this purpose, it would be better to develop a simple and standardized method to evaluate social aspects of transport. Note that such standardization also has a negative aspect, i.e., the method would be applied without careful consideration of possible fallacies and biases. This would be particularly important in discourse concerning mobility of the elderly since policy discussions are not really universal, but rather relative. Furthermore, becoming an aging society would change the role or position of the elderly. Such socio-economic changes at macro level could entirely change mobility discourse of the elderly. If this is the case, temporal and dynamic aspects also need to be seriously considered, especially when policy actions have long-term impacts.

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