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Milla Saajanaho

Personal Goals in Old Age

Relationships with Resources in Life, Exercise Activity, and Life-Space Mobility

JYVÄSKYLÄN YLIOPISTO

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ABSTRACT

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Participation in activities according to one's personal goals is a central component of active aging. This study explored what kinds of personal goals older people have, how these goals change over the years, and how they relate to resources in life. The cross-sectional and longitudinal associations of personal goals with exercise activity and life-space mobility were also examined.

The thesis forms part of two larger studies: Life-Space Mobility in Old Age (LISPE) and the Finnish Twin Study on Aging (FITSA). Data on 824 men and women from the LISPE study (mean age 80.1 y), and 308 women from the FITSA study (mean age 71.2 y) were analyzed. Personal goals were obtained with a revised version of the Personal Project Analysis. Measures of life resources, mobility limitation and physical activity were self-reported. Life-space mobility was assessed with the University of Alabama at Birmingham Study of Aging Life-Space Assessment.

Health maintenance goals were the most commonly reported and they correlated with good health resources. In contrast, recovery goals were more often reported by people with poor health and functioning. Good health resources were associated with goal setting related to other people, leisure-time activities and physical activities. Activity goals were often abandoned with aging, at least partly due to mobility decline. Exercise-related goals correlated with higher exercise activity both cross-sectionally and longitudinally. Life-space mobility was higher among those with goals related to activeness in daily life, mental health, and exercise when compared to those not reporting such goals. Over the two-year follow-up, goals related to maintaining functioning predicted higher life-space mobility – an indicator of community participation.

Poor health and functioning may prevent older people from engaging in active goals in their lives. However, goal engagement may also promote active aging and participation, even in the face of decline in health and functioning. Therefore, older people should be encouraged to actively strive for personal goals in their lives.

Keywords: Personal goals, aging, physical activity, mobility limitation, life-space mobility, life-span development, developmental regulation

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Jyväskylä 29.12.2015

Milla Saajanaho

FIGURES

TABLES

LIST OF ORIGINAL PUBLICATIONS

The thesis is based on the following, original publications, which will be referred to in the text by their Roman numerals.

I Saajanaho, M., Rantakokko, M., Portegijs, E., Törmäkangas, T., Eronen, J., Tsai, L-T., Jylhä, M. & Rantanen, T. Resources in life and personal goals in old age. Submitted for publication.

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III Saajanaho, M., Viljanen, A., Read, S., Rantakokko, M., Tsai, L-T., Kaprio, J., Jylhä, M. & Rantanen T. Older women's personal goals and exercise activity: an eight-year follow-up. Journal of Aging and Physical Activity 2014; 22: 386-392.

IV Saajanaho, M., Rantakokko, M., Portegijs, E., Törmäkangas, T., Eronen, J., Tsai, L-T., Jylhä, M. & Rantanen, T. Personal goals and changes in life-space mobility among older people. Preventive Medicine 2015; 81: 163-167.

ABBREVIATIONS

CAT	Categorical variable
CES-D	Center for Epidemiologic Studies Depression Scale
CI	Confidence Interval
FITSA	Finnish Twin Study on Aging
GEE	Generalized Estimating Equations
LISPE	Life-Space Mobility in Old Age
LSA	Life-Space Assessment
LSMC score	Life-Space Mobility Composite score
MMSE	Mini-Mental State Examination
N	Number
OR	Odds Ratio
P	P-value, indicator of statistical significance
SD	Standard Deviation
SOC	Selective optimization with compensation
W2	Second data wave of the FITSA study
W3	Third data wave of the FITSA study

CONTENTS

1 INTRODUCTION

Population aging has increased the need for promoting continued participation throughout old age. In the Active Aging policy framework issued by the World Health Organization (2002), active aging refers to community participation according to a person's needs, desires, and capabilities. The desires people have are reflected in their personal goals – states that people strive to achieve or avoid in the future (Riediger & Freund 2006). Throughout the lifespan, people have to select the goals that will be the target of their time and energy (Baltes & Baltes 1990). Personal goals can function as a source of energy in maintaining activities that are important for oneself throughout the life span (Baltes 1997). Yet, in gerontology, personal goals have largely been neglected as a research area and the influence of personal goals on older people's activity levels has not, until now, been studied at all. Further, previous research has not addressed the issue of how the pursuit of other personal goals could support or hinder the strivings for active participation in old age. However, it is reasonable to assume that setting goals for the future could positively affect people's behavior by increasing the likelihood of active aging. This possibility is also present in the disablement process model (Verbrugge & Jette 1994), in which psychosocial attributes are embedded as factors that can influence the process of disablement. It has been argued that during the disablement process it is important to use goal-related control strategies to prevent further functional decline (Heckhausen et al. 2013). However, it has not been studied whether personal goals could serve as a means for maintaining health and functioning in old age. Yet, it is reasonable to assume that, as a striving force, personal goals could help older people to preserve their resources with increasing age.

Old age is characterized by many resource losses, the most evident of which are declining health and functioning. Thus, in active aging policies, efforts should be directed at preventing functional decline (Walker 2002). Population aging is widely considered a societal problem. As a result, insufficient attention has been paid to the ways in which older people themselves, as active agents, can influence their own aging process. A successful process can be seen as the outcome of interplay between agency and

adaptive capacity, such as in selecting achievable personal goals, adjusting them to render them compatible with one's capabilities, and being able to disengage from unachievable goals (Brandtstädter 2009; Heckhausen et al. 2010). Previous research on older people's personal goals has stressed the need for goal modification due to age-related losses – a notion embedded in theories on developmental regulation (Baltes & Baltes 1990; Brandtstädter 2009; Heckhausen et al. 2010). However, change in the content of older people's personal goals over the years has not been studied before. Studies have, however, emphasized the benefits of goal modification for psychological well-being (e.g., Bailly et al. 2012; Boerner 2004). It is probable that goal modification serves as a coping method when facing losses, but then it should be accompanied by the selection of new goals that are better suited to the current life situation (Brandtstädter 2015). In this way, goal adjustment could enable continuing participation in different activities according to one's capabilities as well as one's personal goals.

Regardless of the fact that personal goals are seen as a key factor in managing life throughout the life course, and the possibility that personal goals could promote active aging, research on personal goals has mainly focused on young adults. To promote active aging, it would be important for people to strive towards the personal goals that they most value. Nevertheless, previous research on the content on older people's personal goals is scarce and mainly driven by the notion of old age as a time of adaptation, yielding to the need to adjust and disengage from personal goals. This study explores what kinds of personal goals older people set for themselves and how these goals change with increasing age. Furthermore, it also examines how life resources relate to goal setting, and thus also to the possibilities for active aging. The relationship of personal goals to active aging is studied by exploring the associations between personal goals and activity participation, as reflected in exercise activity and life-space mobility. By embedding personal goals in a framework of health and functioning, this study aims to lay a foundation for a new area of aging research at the intersection of traditionally separate fields.

2 REVIEW OF THE LITERATURE

2.1 Personal goals

2.1.1 Definition of personal goals

Personal goals refer to personalized intentions extending to the future. Such intentions have been conceptualized in several ways. In addition to personal goals (used by, e.g., Lapierre et al. 1997, Rapkin & Fischer 1992, Riediger et al. 2005, Salmela-Aro et al. 2009) the concepts of, for example, current concerns (Klinger 1975), personal strivings (Emmons 1986; Romero et al. 2009; Sheldon & Kasser, 2001), life goals (Bauer & McAdams 2004; Coffey et al. 2014; Roberts & Robins 2000), life tasks (Cantor et al. 1991; Zirkel & Cantor 1990), possible selves (Cotrell & Hooker 2005; Markus & Nurius 1986; Smith & Freund 2002), and personal projects (Lawton et al. 2002; Little 1983) have been used to describe similar motivational features behind people's actions.

There has been wide and varied discussion of the differences between these concepts (Bauer & McAdams 2004; Emmons 1986; Klinger 1975, Little 2007; Zirkel & Cantor 1990), yet they can all be seen as variations of human goal constructs (McAdams & Olson 2010). Moreover, it is admitted that when people are asked about, for example, personal projects, their answers include a range of goal constructs from strivings to concerns and life tasks (Little & Gee 2007). This study is driven by the personal project approach developed by Brian R. Little (1983, 2007; see this text, chapter 2.1.3). Little has defined personal projects as "extended sets of personally salient action in context" (Little 2014). They are salient because they are freely generated by people; extended because they extend over a shorter or longer time span; and, in context because they are always generated and pursued in a certain situation and environment (Little 2014). Personal goals are defined as states that people strive to achieve or avoid in the future (Freund & Riediger 2006). Personal projects and personal goals have been perceived as different terms for the same phenomenon (Bauer & McAdams 2004); many researchers consider them as theoretically equivalent

concepts, and they have been used interchangeably in research (Little 2007). The main conceptual difference between personal goals and projects is that projects are typically conceptualized more as wholes, also including activities for pursuing them (Betzler 2013; Little 2007), while goals, although also seen as constructs behind action, do not assume active goal pursuit. The concept personal goal has been dominant in the Finnish research (e.g., Feldt et al. 2012; Salmela-Aro et al. 2009), and was thus also chosen for this study. In the context of this study, personal goals and personal projects are seen as equivalent, and, in the following, unless a specific need arises to distinguish between different concepts, the concept of personal goals is used in referring the literature related to personalized intentions.

Whether conceptualized as personal goals or projects, strivings or concerns, these concepts describe humans as self-motivated subjects who look into the future and can influence their lives by setting goals and directing their actions towards these goals (Brunstein et al. 1999). They guide people's decisions on how they want to invest their time and energy, what to avoid, what to abandon, and how to act in order to steer one's life in the desired direction (Riediger et al. 2005; Smith & Freund 2002). Personal goals differ from the minor routines of daily life to vast projects extending over the human life span (Little 2015). Also, personal goals are different in, for example, levels of abstraction and breadth, they may be difficult to reach or easily attained, realistic or dreamlike (McAdams & Olson 2010), solitary or communal, freely chosen or advocated by others, and they may serve as a source of happiness or of anguish and frustration (Little 2015). In philosophy, personal goals have been discussed as constructs that give meaning to people's actions (Betzler 2013) and existence (Williams 1976/1981).

2.1.2 Assessing personal goals

Most of the research on personal goals in old age comes from the field of developmental regulation. Typically, in such research, measures with scales assessing the informant's general tendency to engage in, disengage from, or adjust personal goals have been used (e.g., Haase et al. 2013). These measures include, for example, the Tenacious Goal Pursuit and Flexible Goal Adjustment scales (Brandtstädter & Renner 1990), the Goal Adjustment scale (Wrosch et al. 2003), the Health Engagement Control Strategies Scale (Wrosch et al. 2002), the Goal Facilitation Inventory (Coffey et al. 2014; Offermann et al. 2010), and the Optimization in Primary and Secondary Control scale (Heckhausen et al. 1998). In this study the focus is on the content of personal goals. The content of personal goals is typically prompted with an open-ended question where people are asked to generate a list of the goals that they are currently pursuing (e.g., Cross & Markus, 1991; Ogilvie et al. 2001; Penningroth & Scott 2012; Riediger & Freund 2006; Smith & Freund 2002). In these measurements, people may freely express the goals they have at the moment in their own words (Lapierre et al. 1992-93). Lawton and colleagues (2002) prompted older people to generate their goals by means of an open-ended method with four different

questions covering the participants' future expectations, plans for the future, meaning in life and more concrete personal projects. Emmons (1986) used a Personal Strivings List where people were asked to list 15 things they are typically trying to accomplish or attain. Lapierre and colleagues (1992-93; 1997) used the Motivational Induction Method to elicit older people's motivational goal objects/personal goals. The method is a sentence completion technique, where people are asked to complete 23 different sentences concerning, for example, what they would like to do or wish to have. One of the rare studies to use a non-open-ended method to examine goal content was that by Rapkin and Fisher (1992), in which a life goal inventory with 112 goal items was used. The participants rated the goal items on a 5-point Likert Scale as either essential, important, desirable, not my concern, or rejected.

A more comprehensive method for studying personal goals, the Personal Project Analysis (PPA), was developed by Brian R. Little (1983) to assess human personality in a social-ecological context. The first part of the PPA is the Elicitation Matrix, an open-ended measure where people are asked to generate a list either of a limited number of goals/projects or of as many as they can think of. Preceding project generation, an introduction on what is meant by personal projects and examples of a person's projects are provided. Next, people are asked to select the ten most important or typical projects for them from among those listed and rate them on a set of 17 dimensions (the Appraisal Matrix; e.g., importance, difficulty, control, stage of achievement). Subsequently the Cross-Impact Matrix (goal vs. goal impact), the Joint Cross-Impact Matrix (impact between goals of two individuals) and the Hierarchy model (hierarchy of a person's goals) have also been added to the PPA (Little 1983, 2007, 2014; Little & Gee, 2007). The Finnish version of the PPA has been modified by Salmela-Aro and colleagues (e.g., Salmela-Aro & Nurmi 1997; Salmela-Aro et al. 2009). The personal project analysis has rarely been used in studies among older people. The exceptions are the studies by Salmela-Aro et al. (2009) and Feldt et al. (2012), who used the Elicitation Matrix to generate the personal goals of older women (Salmela-Aro et al. 2009) and a mainly male sample of retirees (Feldt et al. 2012).

Using an open-ended method to study personal goals in quantitative research requires that the generated goals are classified with a content analytic approach. Depending on the purpose of the study, different classification schemes may be used (Little 1983). Examples of the coding schemes for goal content are presented in Table 1. One of the earliest coding schemes was developed by Little (1983), and had 12 content categories for studying university students' goals. In studies among older people, Lapierre et al. (1992-93) used a coding scheme with ten major motivational categories (as earlier in Nuttin & Lens 1985), Smith and Freund (2002) used six larger goal domains, and Salmela-Aro et al. (2009) used 19 and Feldt et al. (2012) 18 content categories. Lawton et al. (2002) coded the goals of their participants with a data-driven content analysis, and identified 24 content categories. In some studies, goal categories have been combined into larger dimensions either with theory-

TABLE 1 Examples of coding schemes for goal content.

Little 1983	**Lawton et al. 2002**	**Feldt et al. 2012**
Academic	I. *ADL orientation*	I. *Leisure-activities*
Interpersonal	Personal care	Hobbies
Intrapersonal	Eating	Sport activities
Recreational/hobbies	Meal preparation	Renovation work
Reading/cultural	Shopping	Traveling
Gifts/holidays	II. *Active recreation*	Holiday house
Travel	Senior Center	Voluntary work
Environmental adaptation	Friends	II. *Social Relationships*
Vocational	Travel, vacation	Friends
Home activities	Exercise	Children and grandchildren
Spiritual	Cultural, spectator	Family
Health/body	Games, movies	Relationship with spouse
	III. *Other-directed projects*	III. *Health and well-being*
Lapierre et al. 1992-93	Plans fulfilled	Health and well-being
Self	Poor health mentioned	IV. *Self-development and ideological views*
Self-realization	Helping others	Way of life
Realization	Family	Self-development
Contact	Volunteering	World and nature
Contact from others	IV. *Intellectual activities*	V. *Housing and finance*
Wishes for others	Age mentioned	Housing
Exploration	Reading	Finance
Possession	Educational activity	VI. *Other activities*
Leisure	Hobbies	Work-type activities
Transcendental	V. *Home planning*	Daily routines
	Home as object	
	Housing adjustment	
	Home maintenance	
	VI. *Spiritual/moral activities*	
	Identity maintenance	
	Religion	

based (e.g., Feldt et al. 2012) or data-driven approaches (e.g., Lawton et al. 2002). In addition to using content analysis to classify goal content, goals have also been coded on other dimensions, such as approach-avoidance (Elliot & Friedman 2007), motivational orientation (e.g., gain, maintenance or loss-prevention; Ogilvie et al. 2001; Penningroth & Scott 2012; Smith & Freund 2002), or growth orientation (Bauer & McAdams 2004). No efforts have thus far been made to develop a coding scheme for personal goals specifically targeted at studying older people's goals.

2.1.3 Personal goals as a layer of personality

Personal goals describe motivational processes by expressing what people want to attain and how they set, pursue, maintain and abandon strivings in their lives (Freund & Ebner 2005). Although studied also in the framework of motivational psychology (e.g., Nurmi & Salmela-Aro 2006) they are embedded in a larger, life-course developmental perspective on personality (Little 2015; McAdams & Olson 2010), in which they represent the motivational part of the

self (Freund & Ebner 2005). In the three-layer personality theory, personal goals and equivalent constructs are embedded in the second layer of personality, the first layer comprising dispositional traits, i.e. rather stable personal features, and the third integrative life narratives and personal identity (McAdams 1996; McAdams & Olson 2010). The second layer unites all the equivalent concepts used in research to describe personalized intentions that see people as agentic and self-determined beings. Little (2015) stresses that personal projects serve as an integrative unit of human personality, because they simultaneously express the traits, contexts, personal constructs, narratives, and pursuits in people's lives.

The social ecological model of personality

This study draws from Brian R. Little's social ecological model of personality (or of human flourishing) (2007, 2014, 2015). The core idea of the model is that pursuing meaningful and manageable personal projects is essential for the well-being of human-beings. Based on the model, personal projects are set in the context of both stable and dynamic person and contextual features, which influence well-being both directly and indirectly through project pursuit. Relatively *stable person features* include, for example, personality traits and *dynamic person features* any thinkable human features that more easily change over time and over situations. Relatively *stable contextual features* include, e.g., structural, environmental, and economic features that typically do not change much during the life course, in contrast to *dynamic context features*, which are more dependent on personal choices and situations. In the model, the desired outcomes of both person and context features, and personal goal pursuit, include emotional, social and physical well-being, as well as meaning in life and community participation (Little 2007, 2014).

In the social ecological model, personal projects are presented as an easily mutable component of personality, as they may be and often are modified, abandoned or expanded. Yet, in the model, personal projects are not merely an expression of personality, but also manifest the contextual features of a person's life at a specific moment. Little argues that well-being is dependent on the successful pursuit of the most important core projects a person has set for him/herself. Projects that are meaningful, manageable, filled with positive emotions, and supported by other people are more likely to be beneficial for well-being. On the contrary problems in project pursuit may frustrate and lead to reduced well-being (Little 2014).

Personal goals/projects have been considered an especially suitable method for studying older peoples' personality, because through them people may freely name their interests and concerns. They are a part of personality that enables self-development and change, and thus serve as a means for positive personality development, also in old age (Bauer & McAdams 2004; Riediger et al. 2005; Sheldon & Kasser 2001). Notwithstanding, research on personal goal setting and goal adjustment has been largely neglected in the field of gerontology.

2.1.4 Personal goals and developmental regulation in old age

Development is a life-long process, characterized by constancy and change, as well as by developmental gains and losses in all phases of life (Baltes 1987; Heckhausen 1999). People are capable of steering their own development throughout the life span, and personal goals are considered central in developmental regulation (Brunstein et al. 1999; Haase et al. 2013). People may steer their development in three directions: growth, maintenance, and regulation of loss. Developmental growth refers to achieving higher levels of functioning and increases in adaptive capacity, maintenance to stability of functioning in the face of challenges and losses, and regulation of loss to downgrading functioning to a lower level in case attempts at maintenance fail (Baltes 1997). In developmental regulation, the balance between people's own actions and decisions, and uncontrollable factors such as biological changes, life events, and dispositional challenges, is emphasized (Boerner & Jopp 2007; Brandtstädter 2009). Successful development may be seen as interplay between agency and adaptive capacity: selecting achievable personal goals, adjusting them so that they are compatible with one's action potential, and being able to disengage from unachieved goals without regret or negative affect (Brandtstädter 2009; Heckhausen et al. 2010). In other terms, central to successful development is attaining a balance between goal engagement (growth/improvement and maintenance/recovery) and goal disengagement (regulation of loss/re-orientation) (Baltes 1997; Boerner & Jopp 2007).

Theories on developmental regulation

The theoretical background of this study draws largely on three theories of developmental regulation: *the model of selective optimization with compensation* (SOC) by Baltes and Baltes (1990), *the dual-process model of developmental regulation* by Brandtstädter (2009; Brandtstädter & Renner 1990), and *the motivational theory of life-span development* by Heckhausen and colleagues (2010). In all these theories, personal goals bear a central role in developmental regulation and people are seen as agents actively shaping their development in all phases of life. Yet, the concepts used to describe developmental regulation differ between the theories. The SOC model is built on three coping methods: selection, optimization, and compensation (Baltes & Baltes 1990). The SOC model has since also been embedded in an action-theoretical framework, in which emphasis is placed on the processes of setting, pursuing, and maintaining personal goals (Freund 2006, 2008). The dual-process model of developmental regulation by Brandtstädter (2009; Brandtstädter & Greve 1994; Brandtstädter & Renner 1990; Brandtstädter & Rothermund 2002) also focuses on the coping methods, conceptualized as assimilation, which refers to tenacious goal pursuit, and accommodation, i.e., flexible goal adjustment, that people use in steering their lives. Similar phenomena are discussed in the motivational theory of life-span development by Heckhausen and colleagues (2010), who use the concepts of selective and compensatory primary control, and selective and compensatory secondary control. The theory includes the

ideas of selection and compensation derived from the SOC model (Baltes & Baltes 1990) as requirements in optimizing life span development (Heckhausen & Schulz 1995).

The commonalities and differences between the model of selective optimization with compensation, the dual-process model of developmental regulation, and the motivational theory of life-span development have been discussed elsewhere (Boerner & Jopp 2007; Haase et al. 2013). It has been emphasized that the processes described in the theories are essential for adaptation when encountering losses in life, and thus have benefits for successful developmental regulation during the life-span (Boerner & Jopp, 2007; Heckhausen et al. 2010). All the theories emphasize that adaptation to resource losses, i.e., goal adjustment and disengagement, is especially important in old age. Yet, they all highlight people's own active role in shaping their development, and the adaptive meaning of engaging in attainable personal goals, adjusting goals to render them congruent with one's resources, and disengaging from unattainable goals (Haase et al 2013; Heckhausen et al. 2010).

The need for developmental regulation in old age

In discussions on developmental regulation, it has been emphasized that, in old age, the balance between developmental gains and losses inclines towards losses (Baltes 1987; Freund & Riediger 2001) and that the action potential of individuals narrows (Brandtstädter 2009). This, in turn, entails that a growing proportion of one's resources is targeted at regulation of loss (Baltes 1997; Freund & Riediger 2001). Thus, adaptive regulation, such as personal goal adjustment and goal disengagement, has been considered essential in old age (Baltes 1997; Brandtstädter 2009).

The need for developmental regulation in old age is largely derived from diminished resources in different areas of life, of which the most evident are losses in health and in both physical and psychological functioning (Heckhausen 1999; Freund & Riediger 2001). For example, multiple health problems (e.g., Diehr et al. 2013; McLaughlin et al. 2012), decline in physical functioning (e.g., Beckett et al. 1996; Diehr et al. 2013; Seeman et al. 2010), and high frequency of mobility limitations (e.g., Sainio et al. 2006; Shumway-Cook et al. 2005) have been widely reported. Moreover, many older people face cognitive decline (Diehr et al. 2013), dementia (Jorm & Jolley 1998), and/or depression (Diehr et al. 2013).

In addition to health and functional ability, the inevitably shortening life span (Brandtstädter et al. 2010; Heckhausen 1999), and the challenges of old age as a life phase (Heckhausen 1999; Salmela-Aro 2009) set the boundaries for developmental possibilities, and personal goal setting, in old age (Brandtstädter et al. 2010; Heckhausen 1999). The challenges of old age as a life phase are largely rooted in deteriorating health and functioning (Heckhausen 1999; Freund & Riediger 2001). Specific developmental tasks for old age have also been identified. These include accepting one's life as it has been and achieving integrity of self and of one's emotions (Erikson 1980), accepting the imminent

end of life, detaching oneself from one's work role and adjusting to retirement, adjusting to decreasing physical capability (Havighurst 1972; Peck 1968), accepting one's role as an aging person and establishing a constructive role in one's age group, adapting to changing roles in the family and community, and finding a balance between activeness and slowing down (Havighurst 1972; Hutteman et al. 2014). The latter can be seen as referring to finding a balance between active goal pursuit and goal adjustment or disengagement.

Goal pursuit as a central developmental striving force

All the above-mentioned theories on developmental regulation emphasize the relevance of goal pursuit in life-span development. In the SOC model, all three coping methods may be employed for the purpose of goal pursuit. Through *selectio*n, or specifically, through *elective selection* (Freund 2008), people choose the areas of life in which to invest their time and energy. In an action-theoretical framework, elective selection refers to specifying one's goals, building a goal system, and committing oneself to the goals selected (Baltes 1997; Boerner & Jopp 2007; Freund & Baltes 1998). Following goal selection, o*ptimization* is used in targeting efforts and energies on these goals so as to succeed as well as possible in their pursuit (Baltes & Baltes 1990; Baltes 1997). Optimization may include, for example, learning new skills and acquiring new resources needed for goal attainment (Baltes 1997; Freund & Baltes 1998). *Compensation* may be used as a strategy in pursuing one's goals even in the face of obstacles (Baltes & Baltes 1990), and includes means such use of assistive devices and seeking help from other people (Baltes 1997; Freund & Baltes 1998). Correspondingly, according to the motivational theory of life-span development, both primary and secondary control strategies are employed in pursuing one's personal goals. *Selective primary control* includes the efforts invested in goal pursuit, such as time and resources (cf. optimization), whereas *selective secondary control* refers to motivational commitment to the selected goals, e.g. positive appraisals of chosen goals and the diminishing value of alternatives, and a belief in the possibilities of goal achievement (cf. elective selection). *Compensatory primary control* is also targeted at goal engagement and includes the external resources used for goal pursuit, such as help and advice from other people and the use of technical aids (cf. compensation) (Heckhausen et al. 2010). In the dual-process model of developmental regulation, these strategies employed for goal pursuit are conceptualized as a*ssimilation,* which refers to all efforts targeted at reaching one's personal goals (Brandtstädter 2009).

Primary control, i.e., goal engagement strategies, is considered central in developmental regulation, whereas secondary control mainly serves in support of primary control efforts (Heckhausen et al. 2010). Empirical evidence has been found for the importance of maintaining primary control strivings in old age (see a review by Heckhausen et al. 2010). One study reported that actively engaging in health-related control strategies when already experiencing physical symptoms may protect from further decline in health and functioning (Wrosch & Schulz 2008). Further, primary control strategies have been

associated with fewer health problems, less disability (Fiksenbaum et al. 2006; Gitlin et al. 2006b) and depression (Wrosch et al. 2002; Wrosch et al. 2007; Wrosch & Schulz 2008), and lower mortality (Gitlin et al. 2006a). A review of SOC-related research has also indicated that employing goal-related coping strategies is effective in fostering successful development (Freund 2008). Research has supported the notion that older people use selection in prioritizing their activities (Freund & Baltes 2002; Penningroth & Scott 2012; Riediger & Freund 2006; Rush et al. 2011), are liable to use compensation in a loss situation (Freund 2006; Rush et al. 2011), and may employ optimization by maximizing their efforts to continue with their activities even with declined mobility (Rush et al. 2011). However, when a goal has become too difficult to reach, it may sometimes be better to opt for goal disengagement.

Goal disengagement in supporting developmental regulation

Theories on developmental regulation share the same perspective on old age as a time of many resources losses, increasing the need for goal adjustment and disengagement. In this context, selection of the SOC model refers especially to *loss-based selection,* in terms of disengaging from unachievable goals, selecting new goals to replace earlier abandoned goals, and reconstructing one's goal system (Baltes 1997; Boerner & Jopp 2007; Freund & Baltes 1998). Loss-based selection is similar to the concept of *accommodation* in the dual-process model of developmental regulation (Brandtstädter 2009) and to c*ompensatory secondary control* in the motivational theory of life-span development (Heckhausen et al. 2010). These strategies are used in adjusting goals to render them more feasible, rescaling one's expectations, downgrading the meaning of unachievable goals, disengaging from blocked goals without negative affect, and finding new sources of meaning in life (Brandtstädter 2009; Brandtstädter & Renner 1990). It has been reported that with age-related loss of resources the capacity for primary control is reduced (Heckhausen 1997; Heckhausen et al. 2010, 2013; Menec et al. 1999), and also that tenacious goal pursuit (Brandtstädter & Renner 1990; Brandtstädter & Greve 1994) typically decreases. In contrast, the use of secondary control strategies (Heckhausen 1997; Wrosch et al. 2000), loss-based selection (Baltes 1997; Boerner & Jopp 2007; Freund & Baltes 1998), and flexible goal adjustment typically increases in old age (Brandtstädter & Renner 1990; Brandtstädter & Greve 1994). Therefore, it seems that goal disengagement is probably a necessary coping method in old age. Consequently, a working combination of assimilative persistence (goal engagement) and accommodative flexibility (goal adjustment / disengagement) is considered to be the best option for successful developmental regulation in old age (Brandtstädter 2009).

Drawing on the theories discussed above, one of the key premises of this study is that developmental regulation is needed in old age and is reflected in the selection and adjustment of personal goals, as well as in goal disengagement. Three assumptions derived from these theories are included in the theoretical framework of this study. First, resources in life influence the possibilities for

goal selection in old age; second, with increasing age, losses in resources may lead to goal adjustment/disengagement; and third, in light of the primary nature of goal engagement, it is presumed that goal striving may yield beneficial developmental outcomes, which in this study is activity participation as indicated by exercise engagement and life-space mobility.

2.1.5 Personal goal content and goal adjustment in old age

Characteristics of older people's personal goals

Previous research on personal goals in old age has mainly concentrated on the motivational features of goal setting and on measuring the general tendency to adjust goals, for example when encountering health problems. Consequently, only a limited amount of research exists on the content of personal goals in old age. Some of the most comprehensive studies on goal content in old age include Rapkin and Fisher (1992), who studied a mainly female (77%) sample of 179 older people with a mean age of 73 years, Lapierre and colleagues (1992-1993), who studied 708 older people aged 64 to 90 (mean age 75 y; 71 % female), and Lawton and colleagues (2002), who studied 600 people with a mean age of 77 years (60% female). One of the rare longitudinal studies on personal goals in old age was conducted by Smith and Freund (2002) among 206 people aged 70 to 103 (51% female; Smith et al. 2002) with a four-year follow-up.

Although individual differences in goal setting tend to be greater than differences between age groups (Smith & Freund 2002), older people's personal goals typically differ from those of younger adults. The most typical goals among both young and middle-aged adults have been found to be related to work (Salmela-Aro et al. 1993), followed, among young adults, by family, property, health, and education (Salmela-Aro et al. 2012), and, among middle-aged adults, by home-related activities (Salmela-Aro et al. 1993). Family-related goals have been quite common in all age groups (Cross & Markus 1991). The importance of health-related goals for older people has been emphasized (Heckhausen et al. 2013; Martos et al. 2010), and health goals have been among the most frequently reported goals of older people in many studies (e.g., Feldt et al. 2012; Smith & Freund 2002). Older people have also reported a variety of other kinds of personal goals, most commonly related to close relationships, leisure time activities, and basic daily activities (e.g., Feldt et al. 2012; Lapierre et al. 1992-1993; Lawton et al. 2002; Rapkin & Fischer 1992).

Older people tend to have fewer goals than younger people (Cross & Markus 1991; Penningroth & Scott 2012), at least partly due to a narrower focus on just a few selected goals (Riediger & Freund 2006). Compared to younger adults, older people have reported more personal goals expressing intimacy and spirituality than goals related to achievement, competence, knowledge acquisition or having novel experiences (Brandtstädter et al. 2010; Penningroth & Scott 2012). Also, older people tend to have more emphasis on generative (i.e. other-focused) and less on autonomy (i.e. self-focused) goals than younger age groups (Hoppman & Blanchard-Fields 2010). Avoidance motivation is more prevalent in older people's goals than in those of younger people's (Elliot &

Friedman 2007), especially when health has started to decline (Martos et al. 2010). Maintenance and loss-prevention orientation have been found to be more evident in older people's goals than in those of younger people, who more often express strivings towards growth (Ebner et al. 2006; Ogilvie et al. 2001; Penningroth & Scott, 2012). Older people have been shown to focus more on the process of goal pursuit rather than the outcome of goals (Freund et al. 2010). This phenomena has been partly explained by a maintenance orientation (Mustafic & Freund 2012), meaning that because older people strive to maintain their current situation, being able to do something (goal process) is more important for them than its outcome (e.g., improving one's performance in some specific way). Further, older people's goals tend to focus more on the present day or near future rather than longer time spans when compared to the goals of younger adults (Penningroth & Scott, 2012).

Correlates of older people's personal goals

From the perspectives of genetics (Bleidorn et al. 2010; Salmela-Aro et al. 2009; Salmela-Aro et al. 2012), personality traits (Bleidorn et al. 2010; Reisz et al. 2013), and cultural background (Waid & Frazier, 2003), goal setting is influenced by many individual and environmental factors (Haase et al. 2013; Little 2007; Nurmi & Salmela-Aro 2006), as well as biological and socio-structural constraints (Heckhausen 1999). Thus, people of the same age and in the same life phase, and living in a similar context will nevertheless have their own unique personal goals (Rapkin & Fischer 1992; Zirkel & Cantor 1990). Consequently, age-based differences in personal goal content have also been reported among older people. Higher age has correlated with fewer personal goals in total (Lawton et al., 2002; Smith & Freund, 2002), and with fewer goals related to leisure-time activities (Lawton et al., 2002), an energetic lifestyle (e.g., physical activity, running one's own errands; Rapkin & Fischer 1992) and personal characteristics (Smith & Freund 2002). Also, with increasing age older people seem to set more goals related to health (Frazier et al. 2002; Smith & Freund 2002), spirituality (Lawton et al. 2002), and to independence and public services (Rapkin & Fischer 1992). Goals related to other people are common throughout the aging process (Lawton et al. 2002), but may be somewhat less often reported by the oldest olds (Smith & Freund 2002).

It has been theorized that loss of resources – most evidently declining health and functioning (Heckhausen 1999; Freund & Riediger 2001) – in old age has a strong influence on goal setting (Baltes & Baltes 1990; Brandtstädter 2009; Heckhausen et al. 2010). Empirical evidence has supported the notion of health problems relating to goal setting. Poorer health status has been associated with fewer other-directed and intellectual goals (Lawton et al., 2002), and with fewer goals related to personal characteristics (Smith & Freund, 2002). In contrast, those with more health problems have reported more goals related to basic daily activities, independence, public services and safety (Lawton et al., 2002; Rapkin & Fischer, 1992). Also, people with health problems have been reported to engage in more health goals (Martos et al. 2010; Smith & Freund, 2002) and in

goals indicating disengagement (Rapkin & Fischer, 1992). Older people with better cognitive functioning seem to have more personal goals, and especially more goals related to other people and different activities (Lawton et al., 2002). However, in one study, the goals of people with mild or moderate Alzheimer's disease were found to be largely similar to those of healthy older people, except for illness-related goals, which were more often incorporated into the goal system of those with Alzheimer's disease (Cotrell & Hooker 2005). Little research exists on the relationship between physical capability and personal goal content, but some indication of more leisure-time activity goals among those with better physical functioning have been reported (Frazier et al. 2002).

Older men have reported more goals related to continuing at work than women, and older women more goals related to close relationships (Holahan & Chapman 2002), basic daily activities (Lawton et al. 2002), independence, safety, and public services (Rapkin & Fischer 1992) than men. For activity goals in old age, the findings on gender differences have been somewhat inconsistent. In the study by Rapkin and Fischer (1992) older men reported more goals related to an energetic lifestyle than women, in some other studies women have reported more goals related to different leisure-time activities than men (Holahan 1988; Lawton et al. 2002), while in yet another study, no gender differences were observed in endorsing goals related to hobbies or personal growth (Holahan & Chapman 2002).

Furthermore, socio-economic and social resources have correlated with goal setting in old age. People with higher education tend to report more personal goals, especially goals related to leisure-time activities, other people, home planning, personal growth, and to continuation of work (Holahan, 1988; Lawton et al. 2002; Rapkin & Fischer 1992). In contrast, lower education has been associated with goals related to independence, public services, reducing obligations, and considering the hereafter (Rapkin & Fischer 1992). Older people with a lower income have reported more goals related to relationships and leisure-time activities than those with higher income level (Holahan 1988). In one study, being unmarried correlated with more disengagement-oriented goals and goals related to independence, public services, and safety, and being widowed to goals related to getting support (Rapkin & Fischer, 1992). In another study, divorced older people reported more goals related to relationships and leisure-time activities (Holahan 1988) than those who were married. Childless older women have reported more goals related to family than mothers, and mothers more friendship goals than their childless peers (Hoppman & Smith, 2007). Further, different life events and loss of loved ones may influence goal setting in all phases of life (Barreto & Frazier 2012; Boelen 2011).

Goal modification in old age

The theoretical arguments on the need for goal modification in the face of age-related resource losses are well-grounded, whether named as loss-based selection (Baltes & Baltes 1990; Freund et al. 2009), accommodation

(Brandtstädter 2009), or compensatory secondary control (Heckhausen et al. 2010). It has been theorized that goal setting and goal modification may help people adjust to their current life situation, and thus benefit well-being (Nurmi & Salmela-Aro 2006). Health problems, or other resource losses, may cause obstacles to goal pursuit, and even lead to depression (Boersma et al. 2005; Street et al. 2007). This negative pathway may be counteracted by modifying existing goals and disengaging from blocked goals. A vast amount of empirical evidence exists on the benefits of goal modification and disengagement for psychological well-being in old age (Haase et al. 2013; Wrosch et al. 2003; Wrosch et al. 2005), especially among clinical samples with, for example, functional decline (Dunne et al. 2011), vision impairment (Heyl et al. 2007; Heyl & Wahl 2011; Wahl et al. 2004), or chronic pain (Schmitz et al. 1996), and among patients suffering from myocardial infarction (Garnefski et al. 2009), stroke (Davis et al. 2013), lower limb amputation (Coffey et al. 2014), arthritis (Arends et al. 2013), or multiple sclerosis (Neter et al. 2009). However, research has also indicated that well-being may be further improved if goal disengagement is supplemented with re-engaging in new, more attainable goals (Arends et al. 2013; Garnefski et al. 2010; Wrosch et al. 2003, 2005), and with tenacious goal pursuit (Heyl et al. 2007; Heyl & Wahl 2011).

Less is known about the relationship of personal goals and goal adjustment with physical well-being in old age. In one study the tendency for goal disengagement predicted better health for older people with chronic illnesses, but poorer health for those with acute, potentially treatable, conditions. In contrast, goal engagement predicted poorer health for those with chronic illnesses, but greater survival for those with acute conditions (Hall, Chipperfield et al. 2010). Further, it has been reported that while goal disengagement may be beneficial for psychological well-being in the face of health problems, continuing active goal engagement may be better for physical functioning (Wahl et al. 2004). However, it is largely unknown how the contents of older people's personal goals change with aging or when they encounter health problems or functional decline. One four-year follow-up study (Smith & Freund 2002) indicated that personal goals are rather stable in old age. However, with increasing age, goals related to personal characteristics and life events were more often abandoned than adopted. People typically adopted new health-related goals over the years, while no significant changes occurred in the prevalence of goals related to social relationships and personal interests or activities (Smith & Freund 2002).

2.2 Physical capability and activity in old age

2.2.1 The disablement process model

In addition to the social ecological model by Little (2007) and the theories on developmental regulation discussed above, this study draws on the

disablement process model by Verbrugge and Jette (1994), which drew on and expanded the work on disability by Nagi (1976). The disablement process model (Figure 2) describes the pathway from pathology to disability through bodily impairments and functional limitations. Pathologies of the body (e.g., disease, abnormal physiological changes) may lead to impairments (e.g., in the musculoskeletal system), which then manifest in specific body systems. This, in turn, typically leads to functional limitations, such as difficulties in mobility. Functional limitations may cause disability, i.e., difficulties in performing daily life tasks such as household chores and in participation in activities. The model also includes risk factors for developing disability, as well as both extra-individual and intra-individual factors that may help to slow down or alter the course of disablement. In the framework of this study, personal goals and goal modification are seen as psycho-social attributes that function on the pathway to disability. Heckhausen and colleagues (2013) have also argued that during the disablement process it is important to use goal-related control strategies to prevent further functional decline and maintain quality of life. Previous research on goal modification has shown that goal adjustment (Arends et al. 2013; Dunne et al. 2011; Garnefski et al. 2009) and engaging in new meaningful goals (Garnefski et al. 2010; Mak 2011) during the disablement process may prevent psychological disability. Some preliminary evidence exists that goal engagement regardless of bodily impairments may benefit physical functioning

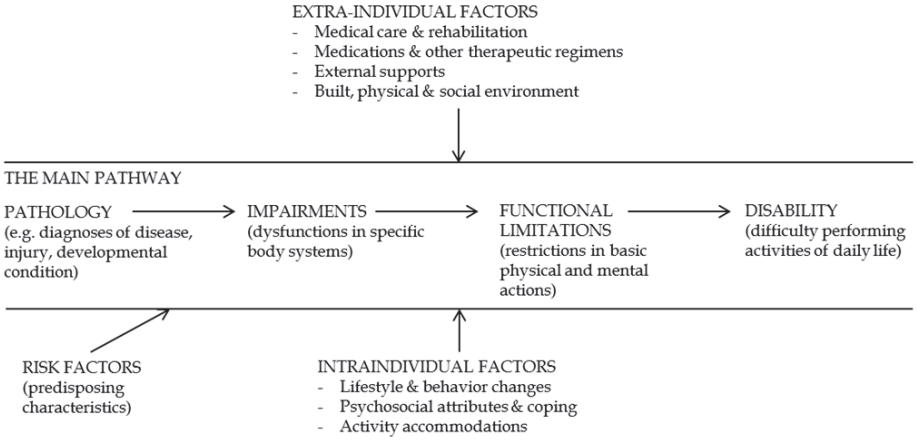

FIGURE 1 The disablement process model adopted from Verbrugge and Jette (1994).

(Wahl et al. 2004). However, research has not addressed the question of how personal goals in different areas of life could help older people to maintain their functional ability with increasing age.

2.2.2 Mobility limitation in old age

Physical capability is a central component of healthy and active aging (Kuh et al. 2014; Paúl et al. 2012; WHO 2002), and mobility a key element of physical capability. Mobility refers to both walking and travelling by different modes of transport. Optimally it enables people to go safely and independently where they want to go, using their preferred means of transportation (Satariano et al. 2012). Sufficient mobility is needed for independent participation in social and other leisure-time activities. Therefore, it is reasonable to assume that the pursuit of personal goals may also be affected by a person's ability to walk or travel independently.

Mobility limitation refers to performance deficits in a given mobility task (Rantakokko et al. 2013a). Walking is central to all forms of mobility, as the independent use of other modes of transportation is largely dependent on walking ability (Rantanen 2013). Walking ability is among the most rapidly declining elements of physical capability after the age of 65 years (Diehr et al. 2013) and it has been estimated that a half of people aged 80 and over experiences difficulties in walking (Ostchega et al. 2000). In the Finnish Health Survey 2011, 35% of men and 49% of women aged 75 and over reported difficulties in walking 500 meters, and 25% and 45% in walking up one flight of stairs. Gait speed also declines rather steadily with aging, and is on average 1.3 m/s among men and 1.1 m/s among women aged 75 and over (Sainio et al. 2012).

Walking limitation occurs early in the disablement process (Rantanen 2013), and is one of the strongest predictors of further disability (Gill et al. 1996; Guralnik et al. 1994, 1995, 2000; Lawrence & Jette 1996). Furthermore, mobility limitation has been shown to predict increases in health care use (Reuben et al. 2004), institutionalization (von Bonsdorff et al. 2006; Guralnik et al. 1994), depression (Vink et al. 2008), and mortality (Guralnik et al. 1994; Studenski et al. 2011). Moreover, quality of life in old age is threatened if mobility is restricted (Netuveli et al. 2006). Although mobility difficulties are common among older people, many are able to avoid at least major problems in mobility. In a comprehensive review, Yeom and colleagues (2008) listed a large number of risk factors for mobility decline among older people, including higher age, female sex, low socioeconomic status, comorbidity, lifestyle factors, physiological factors (e.g., inflammation, nutrition), weak social networks, and some environmental features. However, being even somewhat physically active may significantly help in preventing mobility limitation and further functional decline (Lawrence & Jette 1996; Simonsick et al. 2005).

Both self-reported and performance-based measures can be used to assess mobility. One commonly used performance-based measure is maximal gait speed, which defines the upper limit of mobility (Rantakokko et al. 2013a). Self-reported measures, in turn, bear more relevance to mobility in real life situations, as they reveal people's own evaluation of their mobility in their own surroundings (Rantanen 2013). People are asked to report, for example, whether

they have difficulties in a given mobility task (e.g., in climbing one flight of stairs, moving around the home, using public transportation, driving a car), or in walking a given distance, for example 500 meters or two kilometers. People may report being able to manage the task without difficulties or with some or many difficulties, being unable without help from another person, or being unable to manage even with help (Leinonen et al. 2007; Rantanen et al. 2012). Difficulties in walking long distances (e.g., two kilometers) are considered as early signs of declining mobility, a phase when the disablement process might be more susceptible to interventions (Rantanen 2013). Also, in this early phase of functional decline, the setting and pursuing of personal goals might help to maintain current functional status and slow down the process of disability (Heckhausen et al. 2013). How mobility limitation relates to personal goal setting in old age has not, however, been previously studied. In this study, this topic was addressed by using mobility limitations as predictors of changes in goal content in old age.

2.2.3 Life-space mobility

Life-space reflects the area in which a person purposefully moves (Parker et al. 2001), thus extending mobility from mere physical capability to a measure of people's actual movement in their daily life surroundings (May et al. 1985; Peel et al. 2005), either on foot or by using other means of transportation. Life-space may be restricted to one's bedroom or home, or extend into one's yard, neighborhood, town, or beyond town (Baker et al. 2003; May et al. 1985). Life-space mobility is defined as the size of the spatial area a person moves through in daily life, including the frequency of travel and assistance needed for that travel (Baker et al. 2003). Life-space mobility reflects people's interest in participating in activities and community life outside the home. Therefore, as a measure, life-space mobility combines physical capability with community participation. Assessment of life-space mobility may be used to address various risk factors contributing to mobility decline in old age, both physiological, psychological and behavioral (Baker et al. 2003). One such risk factor might be lack of striving for activities further from home, i.e., social and activity-related personal goals.

The first measures of life-space were developed to measure movement at home and in the near-home environment (The Life-Space Diary; May et al. 1985) and in Institutional settings (The Nursing Home Life-Space Diameter; Tinetti & Ginter 1990). The Life-Space Questionnaire developed by Stalvey et al. (1999) has been used to measure movement across a broader range of destinations among community-dwelling older people (Barnes et al. 2007). The most comprehensive and commonly used measure of life-space mobility is the University of Alabama at Birmingham Study of Aging Life-Space Assessment (LSA; Baker et al. 2003). The LSA measures both the extent and frequency of movement, and assistance needed for that movement from devices or from other persons, in the four weeks immediately preceding the assessment. The LSA covers a wide range of mobility: from being restricted to living in one

room to independent mobility beyond one's hometown. Changes in life-space mobility reflect adaptation to losses in physical capability through, for example, decreased frequency of movement or increasing need of assistance in travelling (Allman et al. 2006). Adjusting one's mobility patterns may also be considered as a coping method used to maintain mobility and prevent further disablement (Baker et al. 2003).

Previous research has consistently shown that life-space mobility declines with aging (Allman et al. 2006; Barnes et al. 2007; Al Snih et al. 2012; Phillips et al. 2015) and is strongly associated with physical capability (Al Snih et al. 2012; Barnes et al. 2007; Portegijs et al. 2014b; Sartori et al. 2012). Further, studies among older people have reported that female sex (Allman et al. 2006; Al Snih et al. 2012; Barnes et al. 2007), lower income (Allman et al. 2006;), health problems (Allman et al. 2006; Al Snih et al. 2012; Phillips et al. 2015), overweight (Al Snih et al. 2012), visual impairment (Barnes et al. 2007), cognitive impairment (Allman et al. 2006; Barnes et al. 2007), depression (Allman et al. 2006; Al Snih et al. 2012; Peel et al. 2005; Polku et al. 2015), difficulties in using transportation (Allman et al. 2006), and self-perceived environmental barriers (Rantakokko et al. 2015a) correlate with life-space restriction. In contrast, higher education (Al Snih et al. 2012; Barnes et al. 2007), better mental health (Byles et al. 2015), social activity (Barnes et al. 2007) and diverse social networks (Suzuki et al. 2014), intellectual (Suzuki et al. 2014) and physical activity (Tsai et al. 2015), environmental facilitators for mobility (Rantakokko et al. 2015a), better cognitive abilities (Sartori et al. 2012), sense of autonomy (Portegijs et al. 2014b), extraverted personality, and having a future-oriented purpose in life (Barnes et al. 2007) have been associated with achieving a wider life-space. Life-space restriction has been reported to increase the risk for Alzheimer's disease and cognitive impairment (Crowe et al. 2008; James et al. 2011), frailty (Xue et al. 2008), nursing home admission (Sheppard et al. 2013), and mortality (Mackey et al. 2014; Xue et al. 2008). Instead, higher life-space mobility correlates with better quality of life (Rantakokko et al. 2013b), and has been reported to help in maintaining quality of life in the face of functional decline (Bentley et al. 2013).

Personal goals have been seen as a mediator between a person and his social and physical environment (Little 1983). They can also work as a pathway to maintaining activities that are important for oneself throughout the life span (Baltes 1997). Some type of goals might motivate people to leave the home and move both in the close vicinity of their homes and further afield. The desire to meet friends or participate in activities further from home might also encourage older people to maintain their life-space mobility despite functional decline. However, previous research has not considered how engagement in personal goals diverse in content might relate to life-space mobility. Also, the question whether personal goals could help in maintaining higher life-space mobility longitudinally, and thus slowdown the process of disablement, remains unstudied.

2.2.4 Physical activity in old age

Physical activity may be the single most efficacious method for preventing functional impairments and further disability in old age (see the review by Paterson & Warburton 2010). Physical activity is defined as "bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen et al. 1985). Physical activity includes all the bodily actions that people engage in in their daily lives, regardless of the strenuousness of the activity. Exercise is one form of physical activity, but it is more planned and structured, with the aim of improving physical fitness (Caspersen et al. 1985).

The benefits of physical activity and exercise have been widely reported and include a variety of improvements in cardiovascular health, muscle functioning, body composition, metabolism, bone health and psychological well-being (as summarized by Cress et al. 2006). However, it has been concluded that light physical activity does not necessarily result in notable health benefits; exercise of at least moderate intensity would be needed (Mechling & Netz 2009; Paterson & Warburton 2010). For example, a relatively high level of physical activity is needed to reduce the risk for functional impairments, disability, cognitive decline, dementia (Paterson & Warburton 2010), and frailty (Peterson et al. 2009). Mortality risk may also be decreased with a relatively low dose of at least moderate intensity physical activity (Hupin et al. 2015).

The need for more strenuous physical activity than that involved in daily chores is also emphasized in the physical activity recommendations of the American College of Sports Medicine and the American Heart Association. It concludes that apart from all the light-intensity physical activity performed in the course of daily life routines, older people should engage in at least moderate-intensity aerobic activity for a minimum of 30 minutes five days a week, or, instead, vigorous intensity aerobic activity for a minimum of 20 minutes three days a week. In addition, muscle strength and endurance training, as well as flexibility training twice a week is recommended (Nelson et al. 2007). Similar recommendations have been published by the World Health Organization (2010) and the Finnish UKK -Institute (2014). However, it has been reported that only between 10 and 15% of older people meet these recommendations for sufficient physical activity (Jefferis et al. 2014; Tucker et al. 2011). In the 2011 Finnish Health Survey, 17% of women and 22 % of men aged 75 and older met the recommendations, and 55% of women and 42% of men did not engage in any leisure-time exercise (Mäkinen et al. 2012).

Although meeting the physical activity recommendations and engaging in a sufficient amount of at least moderate-intensity physical activity would yield the best possible health benefits for older people (Nelson et al. 2007; Paterson & Warburton, 2010), a slight increase in the daily level of activity may already have favorable health effects (Powell et al. 2011). As so few older people meet the physical activity recommendations, it is suggested that more emphasis should be placed on decreasing sedentary time and increasing any type of

physical activity (Sparling et al. 2015). It has been reported that although the physical activity recommendations are not reached, engaging in at least some physical activity in daily life could slow down the disablement process (Dunlop et al. 2014; Miller et al. 2000; Simonsick et al. 2005). Since one of the most significant factors increasing the physical activity levels of older people may simply be going outside the home (Portegijs et al. 2015; Tsai et al. 2015), engaging in personal goals that require older people to go out could be one key factor in increasing physical activity in old age.

2.2.5 Goal setting and physical activity

Only a minor proportion of older people engage in regular exercise, despite the extensive efforts made to promote physical activity among older people, and the effectiveness of several interventions. Many barriers to exercise engagement in old age have been recognized (see the review by Baert et al. 2011), but no clear answer has yet been given to the question of why older people remain sedentary (Mechling & Netz 2009). In old age, one's personal situation may require prioritization of other life goals instead of the pursuit of physical activity. Among younger people, it has been reported that other life goals may interfere with the pursuit of exercise goals (Gebhardt 2008; Karoly et al., 2005; Louro et al. 2007). One of the key issues in efforts targeted at increasing physical activity and exercise adherence in older people might be how the presence of exercise-related personal goals, as well as goals in other areas of life, could affect physical activity. However, this issue has been largely neglected in the previous research.

Overall the research on goals and physical activity is extensive, but it has concentrated mainly on, for example, young athletes' achievement goals (e.g., Li 2010), the relations of goals to athletes' performance (e.g., Stoeber et al. 2009), and on the role of autonomous motivation in exercise engagement (e.g., Chatzisarantis & Hagger, 2009; Fortier & Kowal, 2007; Vansteenkiste et al. 2004). The role of setting specific goals for physical activity and exercise has also been widely studied (see the review by Shilts et al. 2004), including older people (e.g., Anderson-Bill et al. 2011; Hall, Crowley et al. 2010; Kelley & Abraham 2004; Umstattd & Hallam 2007) and people with specific health problems (e.g., the review by Ferrier et al. 2011). Setting specific health and exercise goals has led to increased physical activity levels among older adults (Hall, Crowley et al. 2010) and it has been concluded that goal setting is an important component behind older people's exercise activity (Anderson-Bill et al. 2011; Umstattd & Hallam 2007). It has been stressed that the goals for physical activity need to be self-chosen if they are to increase activity levels (e.g., Hurkmans et al. 2010). In addition to goal setting, the intention to engage in (Caudroit et al. 2011; Kanning & Schlicht 2008; Lutz et al. 2008; Renner et al. 2007) and the planning of (Gellert et al. 2014; Lutz et al. 2008; Renner et al. 2007) exercise has been reported to increase physical activity levels among older people. Both intention and planning can be seen in a situation where a person sets a personal goal related to exercise.

Research on the setting of specific goals for exercise or increasing physical activity levels is distinct from research on personal goals in general. Having a personal goal related to physical activity or exercise means that this goal has been selected as one among all the other personal goals in a person's life. Since personal goals are self-chosen, and since having personal goals related to physical activity or exercise also indicate the intention to be physically active, it seems reasonable to assume that they could be related to physical activity and exercise adherence. There seem to be no studies on the association between physical activity- or exercise-related personal goals and people's actual physical activity levels. Among younger people, having physical health goals has been associated with more leisure-time physical activity (Gallagher et al. 2012). It has also been reported that, among women of all ages, personal improvement goals correlate with more frequent exercise (Papaioannou et al. 2011). One study among older people indicated that having goals related to health, and prioritizing such goals, was related to favorable health behaviors, including exercise (Hooker & Kaus 1992).

In order to actively engage in, for example, exercise-related goals amongst other valued life goals, room must be left for them. Moreover, other personal goals may either conflict or facilitate the pursuit of exercise goals, and exercise goals may either conflict or facilitate the pursuit of other life goals (Hollema et al. 2009). It has been reported that sedentary people engage more in some other activities than those who exercise regularly (Gebhardt & Maes 1998). Moreover, it seems that in comparison with their less active counterparts active exercisers place greater value on their exercise-related goals, and are better able to simultaneously manage their other valued life goals (Jung & Brawley, 2010; Karoly et al. 2005). One study among older people reported that intergoal facilitation, i.e., having goals that are easier to pursue simultaneously, may lead to the increased pursuit of exercise-related goals (Riediger & Freund 2004). Thus, promoting physical exercise entails taking into account other goals the person may have, since these may hinder or support the attainment of exercise-related goals (Karoly et al. 2005).

Sedentary behavior may be accounted for a situation where other life goals are prioritized over exercise-related goals. This may be even more evident in old age, when life resources diminish, and people have to select in which activities to invest their energy (Baltes & Baltes 1990). However, the influence of personal goals related to physical activity or exercise on older people's activity levels has not been studied before. Further, the previous research has not addressed the issue of how the pursuit of other personal goals could support or hinder the strivings to be physically active in old age.

3 PURPOSE OF THE STUDY

The purpose of this study was twofold: first, to study what kinds of personal goals older people have, how these goals relate to resources in life, and how they change with increasing age. Second, the aim was to investigate how personal goals relate to exercise activity and life-space mobility in old age.

The specific research questions were:

1. What kinds of personal goals do older people have? How do the personal goals differ according to personal characteristics and to socio-economic, social and health resources (Study I)?

2. How do older people's personal goals change over time? Is mobility limitation related to these changes (Study II)?

3. What are the associations between older people's personal goals and exercise activity? Do other personal goals correlate with exercise-related goals (Study III)?

4. To what extent do personal goals predict changes in life-space mobility in old age (Study IV)?

The conceptual framework of the study, which is largely derived from the social ecological model of human personality by Brian R. Little, is presented in Figure 1. In addition, this study draws on the theories of developmental regulation (Baltes & Baltes 1990; Brandtstädter 2009; Heckhausen et al. 2010), and the disablement process model (Verbrugge & Jette 1994). Based on these theoretical foundations, it is hypothesized that the possibilities for goal setting in old age are associated with resources in life, that mobility limitation may result in goal disengagement, and, that goal engagement may promote active participation.

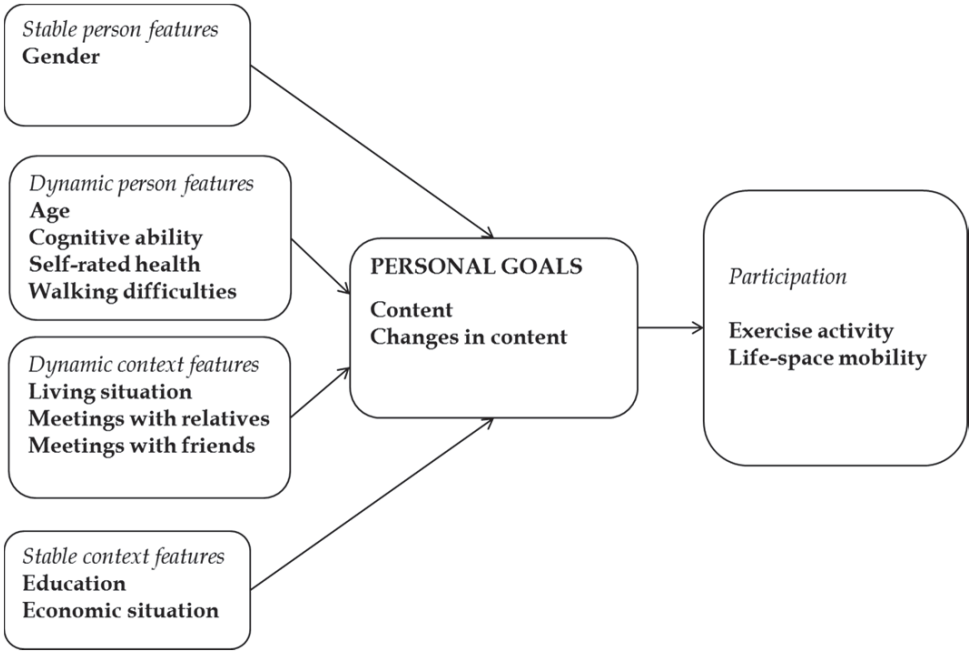

FIGURE 2 Conceptual framework of the study; revised from Little 2007, 2014; study variables bolded; arrows indicate associations studied.

4 MATERIALS AND METHODS

4.1 Study design and participants

The data for this study were drawn from two research projects conducted at the University of Jyväskylä: Life-Space Mobility in Old Age (LISPE) and the Finnish Twin Study on Aging (FITSA). The LISPE project was a prospective cohort study with one- and two-year follow-ups among community-dwelling older people residing in the areas of Jyväskylä and Muurame. The aim of the LISPE study was to examine the interactions between home and neighborhood characteristics and older people's health, functioning, life-space mobility, and quality of life. The focus of the FITSA project has been on the genetic and environmental factors influencing functioning among older women. The datasets and study populations used in this study are summarized in Table 2.

TABLE 2 Datasets, designs and number of participants in the different studies.

		Dataset	Study	n	Age, years (M ± SD)
Cross-sectional analyses		LISPE	I	824 Individuals Men n=311 Women n=513	75-90 (80.1 ± 4.2)
		FITSA	III	308 Women	66-79 (71.2 ± 3.3)
Longitudinal analyses	2-year follow-up	LISPE	IV	824 Individuals Men n=311 Women n=513	75-90 (80.1 ± 4.2)
	8-year follow-up exercise activity	FITSA	III	239 Women	66-78 (70.8 ± 3.2)
	personal goals	FITSA	II	205 Women	66-78 (70.9 ± 3.2)

M = Mean
SD = Standard deviation

4.1.1 Life-Space Mobility in Old Age (LISPE; studies I and IV)

The LISPE study was conducted among community-dwelling people aged 75 to 90 living in the municipalities of Jyväskylä and Muurame in Central Finland (Rantanen et al. 2012). A random sample of 2550 people was drawn from the Finnish Population Register, and included subsamples from three age groups: 75-79, 80-84, and 85-89 years. A letter with information on the study protocol was sent to the potential participants, after which they were contacted via telephone to enquire if they were interested in participating in the study. To be included in the study, persons willing to participate needed to be living independently in their own homes inside the recruitment area, and not have any severe problems in memory or communication. Of the initial sample of 2550 people, 2 269 were reached by telephone. Of those reached, 1 111 declined to participate and 304 did not meet the inclusion criteria. Finally, between January and June, 2012, 854 persons were interviewed in their homes by trained interviewers. An additional four persons were excluded from the study during the at-home interview due to communication problems and data from two interviews were lost due to a technical problem. Thus, the baseline LISPE sample was 848 persons, of whom 824 answered the question on personal goals at the baseline assessment and thus were included in the present study. The baseline data were used in the cross-sectional analyses of Studies I and IV.

The first follow-up of the LISPE study was conducted at one year, and the second two years after the baseline home interviews. The follow-up interviews were conducted via telephone and an additional postal questionnaire was included in the second follow-up. Of the 824 participants in this study, 793 participated in the first, and 742 in the second follow-up. During the two follow-up years, 39 people died and 13 moved into an institution. Other reasons for attrition were moving outside the study area (6), inability to communicate (12), poor health (4), not willing to participate (6), and not reached (2). The LISPE follow-up data were used in the longitudinal analyses of Study IV.

4.1.2 Finnish Twin Study on Aging (FITSA; Studies II and III)

Participants for the FITSA study were drawn from the Finnish Twin Cohort, which includes all same-sex twin pairs born in Finland before 1958 and alive in 1975 (Kaprio et al. 1978). The baseline data of the FITSA study were collected in 2000-2001, when 217 female twin pairs (434 individuals) between the ages of 63 and 76 were recruited for the study (Pajala et al. 2006; Rantanen et al. 2003). To be included in the FITSA study, both co-twins had to agree to participate and be able to travel to the study center. The second FITSA data collection wave (W2) was conducted in 2003-2004 with 419 participants and the third wave (W3) in 2011 with 344 participants. The first two data collection waves included an examination by a physician, multiple tests on health and functioning, and information gathered via questionnaires. The third data collection wave was conducted via postal questionnaires. The questionnaire data were checked and,

when feasible, missing sections were completed by interviewing the participant over the phone.

In this study, the baseline of the analysis using the FITSA data was set at the second data collection wave, when the Personal Project Analysis (PPA; Little 1983) was added to the study protocol. Of the 419 women who participated in W2, 308 answered the PPA in a structured interview and thus comprised the study sample used in the cross-sectional analyses of Study III. Between W2 and W3, 25 of the 308 women died, 15 were unable or unwilling to participate to W3, and six could not be reached. Further, 23 participants had missing information on exercise activity, and 57 women did not answer the PPA in the postal questionnaire. This left 239 women who had reported their exercise activity at W2 and W3 and were included in the longitudinal analyses of Study III. 205 women had answered the PPA on both occasions and hence were included in the longitudinal analysis of Study II.

4.2 Ethics

The LISPE project was approved by the Ethical Committee of the University of Jyväskylä, Finland, and the FITSA project by the Ethics Committee of the Central Finland Health Care District. Participants in both projects were informed about the research before the baseline assessments and gave their written informed consent. Good scientific practice was followed throughout both studies in accordance with the principles laid down by the Declaration of Helsinki.

4.3 Measurements

4.3.1 Personal goals

In both the LISPE and FITSA studies the content of the participants' personal goals was studied using a modified version of the Elicitation Matrix of the Personal Project Analysis (PPA; Little 1983). In the FITSA study (see Salmela-Aro et al. 2009), the PPA was conducted via a structured interview, and the participants were asked to name four current personal goals that they have. The following question was used to elicit the content of the personal goals: "*People have many kinds of things that they think about, hope for and hope to accomplish. Think about the kinds of personal goals/projects you have in your life at the moment. The goals/projects may be related to any life domain, such as hobbies, work, family, friends or yourself.*" In the follow-up postal questionnaire in 2011, the question on personal goals was introduced with a similar wording.

At baseline of the LISPE study, the content of current personal goals was asked during the home -interview. The goal question was based on the FITSA

study, with slight modifications, as follows: "*We all have different personal goals that we strive to realize in our daily lives or reach in the future. The goals may be related to any life domain, such as hobbies, daily life, health, family, or friends. Think about the goals you have at the moment. The goals can be big or small; the main thing is that they are important for you.*" The participants could freely name as many personal goals as they wished. If needed, examples of younger people's personal goals were given to help respondents understand what is meant by personal goals.

In both the FITSA and LISPE studies, personal goals were classified on the basis of their content by two trained assessors working independently. The same coding scheme with 19 goal categories was used in the FITSA study in 2003-2004 and in 2011 (Table 3). The coding scheme was developed by Salmela-Aro and colleagues (2009) in accordance with the coding schemes used in earlier studies (Little 1983). In the LISPE study, this coding scheme was developed further to better distinguish the goals of older people and single out different kinds of health-related goals. The coding scheme contained 25 goal categories (Table 4). In the FITSA study, the percentage rate of agreement between the two goal classifiers was 91% at baseline, as reported by Salmela-Aro et al. (2009), and 84% at the follow-up, and in the LISPE study 89%. Discrepancies between the classifiers were discussed until total agreement on the categorizations was achieved.

In both the FITSA and LISPE studies each of the personal goal categories was coded on a dichotomous scale, in which 1 indicated having at least one goal in the category, and 0 meant having no goals in the category. A person could have goals in several different categories or several goals in the same category. Both studies also had an additional goal category of "no goals".

TABLE 3 Coding scheme for personal goals in the FITSA study (Studies II & III).

Health and functioning	Memory
Exercise	Economic issues
Busying oneself around the home	Work
Cultural activities	Others' health and well-being
Social activities	Care of others
Close relationships	Religion
Independent living	Politics
Travel	Self-development
Diet / Outlook	Other
Living with symptoms / illness	

TABLE 4 Coding scheme for personal goals developed for the LISPE study (Studies I & IV).

Healthy lifestyle	Hobbies at home
Maintaining health	Family
Recovery / Managing illnesses	Meeting other people
Improving functioning	Other's health and well-being
Maintaining functioning	Helping others
Mental health	Character
Independent living	Philosophy of life / Religion
Life as it is	Travel / Summer Cottage
Living arrangements	Economic issues
Exercise	Common good
Activeness in daily life	End-of-life issues
Participation in social events	Other
Hobbies outside home	

4.3.2 Exercise activity

In the FITSA study, self-reported exercise activity was assessed with the following question: "Next you can see five options that describe the amount of leisure time exercise. Which of these options best describes your exercise activity throughout the year?". The answer options were: no exercise, some exercise, a moderate amount of exercise, quite a lot of exercise and a great deal of exercise. For further analysis exercise activity was dichotomized, and high exercise activity was defined as reporting quite a lot or a great deal of exercise with a moderate amount, some, or no exercise as the reference group. Consequently, those reporting at least quite a lot of exercise at both baseline and follow-up were included in the continuously high exercise activity group while those reporting a moderate amount, some, or no exercise at both or either of the measurements formed the reference group.

4.3.3 Life-space mobility

In the LISPE study, life-space mobility was measured using the University of Alabama at Birmingham Study of Aging Life-Space Assessment (LSA; Baker et al. 2003), which was translated into Finnish (Rantanen et al. 2012). The life-space measure reflects the area through which a person has moved during the past four weeks, the frequency of moving, and the need of help from any devices or another person. The assessment includes six life-space tiers starting from the bedroom and expanding to the home, yard, neighborhood, town, and beyond town. For each tier the participants were asked how often they moved in the respective area and whether they needed help from any devices or another person to do so. The reliability and validity of the LSA measurement have been established (Allman et al. 2006; Baker et al. 2003), and a test-retest study has found it to be fairly reliable and responsive to change in the Finnish context,

although somewhat more variation may exist in the winter than spring scores (Portegijs et al. 2014a).

At baseline of the LISPE study, the LSA was conducted in face-to-face interviews, and at the first and second follow-ups via telephone interviews. For the analysis we used a life-space mobility composite score (LSMC score), which reflects the distance, frequency, and level of independence of mobility. The score ranges from 0 to 120 with higher scores indicating higher life-space mobility.

4.3.4 Mobility limitation

In the LISPE study, difficulties in walking two kilometers was asked with the question "Are you able to walk about two kilometers?" The response options were 1) able without difficulty, 2) able with some difficulty, 3) able with a great deal of difficulty, 4) unable without the help of another person, and 5) unable to manage even with help. In Study I, the answers were categorized as having no difficulties, having minor difficulties, and having major difficulties/needs help/unable, and in Study III a dichotomized measure of no difficulties vs. at least some difficulties was used. In the FITSA study, difficulties in walking two kilometers was asked with the question "Do you have difficulties in walking two kilometers due to your health or physical condition?" The response options were 1) no difficulties, 2) minor difficulties, 3) major difficulties and 4) need help/cannot. In Study I, the measure of difficulties in walking two kilometers was used as one indicator of health resources.

For the analysis of Study II, two additional indicators of mobility limitation were used: difficulties in climbing stairs ("Do you have difficulties in climbing one flight of stairs due to your health or physical condition?"), and difficulties in using public transportation ("Do you have difficulties in using public transportation due to your health or physical condition?"). The response options for these questions were 1) no difficulties, 2) minor difficulties, 3) major difficulties and 4) need help/cannot. For further analysis, the answers to the questions on mobility limitation were dichotomized as having at least minor difficulties vs. having no difficulties in the respective mobility indicator.

4.3.5 Other study variables

Socio-demographic indicators

In both the LISPE and FITSA studies, the age and gender of the participants was retrieved from the National Population Register. Years of education was asked with the question "How many years of education have you had in total?". In addition, the participants rated their economic situation as 1) very good, 2) good, 3) moderate, 4) poor or 5) very poor. The answers were dichotomized as good or very good vs. moderate, poor or very poor. In Study I, years of education and perceived economic situation were used as indicators of socio-economic resources. Having at least eight years of education, or perceiving

one's economic situation as good or very good, was defined as having good socio-economic resources in the respective indicator.

Social resources

In Study I (LISPE), living situation and frequency of meetings with relatives and friends were used as indicators of social resources. Living situation was asked with the question "Who do you live with?" The response options were 1) alone, 2) with a spouse/partner, 3) with children or grandchildren, and 4) with relatives, siblings or other people. For further analysis the answers were dichotomized as living with someone vs. living alone. The frequency of meetings with relatives was asked with the question "How often do you meet your children or other relatives?" The response options were 1) daily, 2) weekly, 3) monthly, 4) a few times a year, 5) seldom or not at all, and 6) do not have any children/relatives. Meetings occurring at least weekly were defined as frequent meetings with relatives, and meetings less than weekly as the reference group. The frequency of meetings with friends was asked with a similar question and response options, and the responses were dichotomized correspondingly.

In the FITSA study marital status was self-reported with the options single, married, remarried, cohabiting, divorced or separated, and widowed. The measure was dichotomized as in a relationship vs. not in a relationship.

Health resources

In both the LISPE and FITSA studies, the participants rated their general health from the options 1) very good, 2) good, 3) moderate, 4) poor, and 5) very poor. For further analysis, the answers were categorized as good/very good, moderate, and poor/very poor. In the LISPE study, number of chronic diseases was calculated based on physician-diagnosed conditions, self-reported from a list of 22 chronic conditions. Diagnoses not included in the list were prompted with an additional open question. Cognitive ability was assessed with the Mini-Mental State Examination (MMSE; Folstein et al., 1975), the reliability of which has been demonstrated (Lopez et al. 2005). The MMSE score ranges from 0 to 30. In study I, a MMSE score of at least 24 was defined as having good cognitive resources. 24 is a commonly used cut point for indicating cognitive decline (Folstein et al. 2001). In the FITSA study, depressive symptoms were examined using the Center for Epidemiologic Studies Depression Scale (CES-D Score; Radloff 1977), the reliability and validity of which has been demonstrated (Beekman et al. 1997).

Self-rated health and cognitive ability were used as indicators of health resources in Study I.

The study variables are summarized in Table 5.

TABLE 5 Summary of the study variables.

Variables	Study	Methods and reference
Personal goals (cat)	I-IV	Personal Project Analysis; Little 1983
Exercise activity (cat)	III	Self-reported
Life-Space Mobility (composite score)	IV	University of Alabama at Birmingham Study of Aging Life-Space Assessment; Baker et al., 2003
Mobility limitations		
Difficulties in walking two kilometers (cat)	I-IV	Self-reported; Leinonen et al. 2007
Difficulties in climbing stairs (cat)	II	Self-reported; Mänty et al. 2007
Difficulties in using public transportation (cat)	II	Self-reported
Health resources		
Self-rated health (cat)	I-III	Self-reported; Maddox 1962
Presence of chronic diseases (n)	IV	Self-reported physician-diagnosed conditions; Nosikov & Gudex 2003
Cognitive ability (sum score)	I	Mini-Mental State Examination, MMSE; Folstein et al. 1975
Depressive symptoms (sum score)	II-III	Center for Epidemiologic Studies Depression Scale, CES-D Score; Radloff 1977
Social resources		
Living situation (cat)	I	Self-reported
Marital status (cat)	II	Self-reported
Meetings with family members (cat)	I	Self-reported; Lyyra et al. 2010
Meetings with friends (cat)	I	Self-reported; Lyyra et al. 2010
Socio-demographic indicators		
Age	I-IV	National registers
Gender (cat)	I, IV	National registers
Years of education	I-IV	Self-reported; Pohjolainen et al. 1997
Perceived economic situation (cat)	I-IV	Self-reported; Pohjolainen et al. 1997

cat=categorical variable; n=number

4.4 Statistical analysis

The analyses utilizing the LISPE data (Studies I & IV) were conducted using SPSS 20.0/22.0 for Windows (IBM SPSS Inc.). The twin sample of the FITSA data (Studies II & III) was treated as a set of individuals and the interdependency of twin sisters was taken into account in all the analysis. Stata statistical software (version 12.1/13.0, StataCorp., College Station, TX) was used in the analysis of the FITSA data.

Descriptive statistical analysis

The descriptive characteristics are reported as mean values and standard deviations for continuous variables and percentage distributions for categorical variables. In the LISPE study, differences between groups were analyzed using independent sample's t-test and chi-square test, and the correlations between the study variables were computed using Spearman's rank correlation coefficient. In the FITSA study, differences between groups were analyzed using Wald tests adjusted for dependency within twin pairs. All tests were performed two-tailed. In Study II the significance of changes in the total proportions of participants reporting goals in each goal category between baseline and follow-up was tested using the McNemar test. The level of significance in all the descriptive analysis was set at $p<.05$.

Dimension reduction of the goal categories

For the purposes of Study I, the original 25 personal goal categories in the LISPE data were combined thematically by a panel of four researchers into seven larger goal dimensions. Prior to the thematic categorization, data-driven statistical methods for combining the categories were conducted (factor analysis, multidimensional scaling, and cluster analysis). Since the correlations between the goal categories were low (range from -.131 to .194), these data-driven methods did not produce meaningful results and the approach was abandoned. Thematic categorization resulted in seven goal dimensions.

Health maintenance goals included strivings toward maintaining current mental and physical health, and functional status. The health maintenance goals most typically mentioned were rather unspecified statements of wanting to stay healthy or maintaining functioning.

Recovery goals included goals related to improving current functional status and to recovering from illnesses or managing life with them. Goals in this dimension ranged from strivings to reach an earlier state of functional ability to knee rehabilitation after surgery, and living as healthy a life as possible despite illnesses.

Social goals comprised of goals related to other people, either to family members or other relationships. This dimension also included goals indicating concerns over other people's well-being or concretely helping others.

Leisure-time activity goals were typically related to recreation, either at home (e.g., reading, handicrafts) or outside home (e.g., going to the theater, attending lectures). Also included in this dimension were goals related to participation in social events or group meetings, and to travelling or spending time at the summer cottage.

Physical activity goals were either exercise goals, or other goals including a clear physical activity component, such as busying oneself around the home doing, for example, heavier household chores or gardening.

Daily life goals were related to the continuance of everyday life as it is now and living independently in one's own home. Goals related to living arrangements and economic issues were also included in this dimension.

Ideological goals included goals related to one's personal character, the common good, end-of life issues, and one's philosophy of life or religion. The element linking these goals was that they reflected inner thoughts and pondering instead of engagement in some kind of activity.

The thematic goal dimensions were dichotomized into at least one reported goal in a dimension vs. no reported goals in a dimension.

Multivariate modelling

In Study I, multivariate logistic regression models were used to study the associations of life resources with each of the seven goal dimensions separately. In these models, all the life resource predictor variables were simultaneously present.

In Study II univariate logistic regression models were used to analyze the association between age, mobility limitations, and changes in personal goal content. Due to a small number of participants, only five of the goal categories were included in the study, and the models could not be adjusted for any of the baseline characteristics. First, age and each of the mobility indicators was entered in the univariate model separately with "engaged in a goal" as the dependent variable (compared to "did not engage in a goal"). When predicting engagement in a goal, the model only included participants who did not have any goals in the goal category at baseline. Each variable separately was then entered in the model with "disengaged from goals" as the dependent variable (compared to "maintained goals"). When predicting disengagement from goals, the model included only participants who had at least one goal in the goal category at baseline. Finally, we formulated similar univariate models for each goal category, using the follow-up mobility indicators and adjusting these models with the baseline information of the same mobility indicators.

In Study III, age-adjusted odds ratios were calculated to describe the association of each personal goal category and high exercise activity cross-sectionally. Next, all the goal categories were included simultaneously in the same logistic regression model, which was adjusted for age, years of education, perceived economic situation, self-rated health, CES-D score and difficulties in walking two kilometers. Similar models were conducted to analyze the association between personal goals and continuously high exercise activity over the follow-up. Further, age-adjusted odds ratios were calculated to examine the associations between the exercise-related and other personal goals. After this, a multivariate logistic regression model was formulated with exercise-related personal goals as the outcome variable and all the other personal goals as predictors simultaneously with the above mentioned covariates.

In addition, age- and gender-adjusted multivariate logistic regression analyses were used to examine the associations between the goal dimensions of the LISPE study and the eight most frequent goal categories of the FITSA study. A separate model was conducted for each of the goal dimensions/categories with all the other goal dimensions/categories simultaneously as predictors.

Generalized estimating equations

In Study IV, generalized estimating equations (GEE) model (Liang & Zeger 2006) were used to study the changes in the life-space mobility composite score based on reporting vs. not reporting personal goals in each of the goal categories. In the model, an unstructured outcome covariance matrix was specified. The main effects of personal goals on life-space mobility and time-interaction effects for the one- and two-year follow-ups were estimated. Goal categories reported by less than 30 participants were not included in the model, as a lack of power prevented meaningful multivariate modelling. Also, only goal categories based on which there was a significant difference ($p<.10$) in the life-space mobility score at baseline or at either of the follow-ups were included in the GEE -model. This left 11 goal categories to be analyzed. As the correlations between the goals categories were low (range from -.131 to .194), they were all included in the same model as individual dummy predictor variables. An age- and gender-adjusted model, and a model which was further adjusted for years of education, perceived economic situation, number of chronic conditions, and perceived difficulties in walking two kilometers (fully adjusted) was conducted. There were no substantial differences between the models, and thus only the results of the fully adjusted model are reported. A separate GEE -model with similar adjustments was used to study changes in the LSMC score with reporting at least one goal as a predictor variable. The level of statistical significance was set at $p<.05$.

5 RESULTS

5.1 Characteristics of the participants

A total of 1132 older people between the ages of 66 and 90 participated in this study. The descriptive characteristics of the study participants are summarized in Table 6.

Prevalence of mobility limitation among the study participants
The prevalence of difficulties in walking two kilometers was 41% for the LISPE participants (Table 6) and 33% / 34% among the FITSA participants (Table 7). Of the FITSA participants in Study II, 27% reported having difficulties in climbing stairs and 11% in using public transportation. Of the FITSA participants who did not report difficulties in the respective mobility indicator at baseline, 42% had developed difficulties in walking two kilometers, 29% in climbing stairs and 27% in using public transportation by the follow-up (Table 7).

TABLE 6 Participant characteristics of the LISPE and FITSA datasets used in the study.

	Study I & IV **LISPE** n=824	Study II **FITSA** n=205	Study III **FITSA** n=308
	M ± SD	M ± SD	M ± SD
Age	80.1 ± 4.2	70.9 ± 3.2	71.2 ± 3.3
Education (years)	9.6 ± 4.2	9.0 ± 3.2	8.7 ± 3.0
CES-D score	-	11.1 ± 7.2	11.4 ± 7.3
MMSE score	26.2 ± 2.8	-	-
Chronic diseases (number)	4.4 ± 2.4	-	-
	%	%	%
Women	62	100	100
Perceived economic situation			
Good or very good	51	27	27
Moderate	47	72	72
Poor or very poor	2	1	2
Self-rated health			
Good or very good	37	31	29
Moderate	54	65	66
Poor or very poor	9	4	5
Difficulties in walking 2 km			
No difficulties	59	67	66
Minor difficulties	20	22	23
Major difficulties	8	7	7
Needs help	2	4*	5*
Unable	11		

M = Mean
SD = Standard Deviation
* Needs help in or is unable to walk two kilometers

TABLE 7 Mobility limitation frequencies of participants in Study II (FITSA; n=205).

	Baseline	Follow-up	
		No difficulties	Difficulties
	% (n)	% (n)	% (n)
Walking 2 km			
No difficulties	67 (137)	58 (76)*	42 (56)*
Difficulties	33 (68)	9 (6)#	91 (62)#
Climbing stairs			
No difficulties	73 (149)	71 (103)*	29 (43)*
Difficulties	27 (56)	26 (14) #	74 (39) #
Using public transportation			
No difficulties	89 (183)	73 (130)*	27 (47)*
Difficulties	11 (22)	27 (6) #	73 (16) #

* Proportion of those with no difficulties at baseline
# Proportion of those with difficulties at baseline
Note. Walking 2 km at follow-up, n=200; Climbing stairs at follow-up and using public transportation at follow-up, n=199.

5.2 The content of and changes in older people's personal goals (Studies I, II)

The total number of personal goals reported per participant ranged from zero to seven in the LISPE study, from zero to six in W2 of the FITSA study, and from zero to eight in W3 of the FITSA study. Typically the participants reported from one to three personal goals (Table 8).

TABLE 8 Total number of personal goals reported by the study participants % (n).

Number of personal goals reported	**LISPE** n=824	**FITSA W2** n=308	**FITSA W3** n=205
0	6 (51)	1 (3)	2 (4)
1	24 (201)	10 (31)	24 (63)
2	28 (228)	30 (92)	28 (74)
3	21 (174)	37 (114)	22 (60)
4	12 (95)	17 (51)	16 (43)
5	5 (38)	4 (13)	4 (11)
6	3 (26)	1 (4)	2 (6)
7	1 (11)	-	1 (3)
8	-	-	1 (1)

The personal goal categories, examples of their content and the number of participants reporting goals in each category are presented in Table 9. In the LISPE study, the separate goal categories were thematically combined into larger goal dimensions. About a half of the study population reported at least one goal in the health maintenance dimension, 33% reported social goals, 31% leisure-time activity goals, 30% daily life goals, 24% physical activity goals, 8% recovery goals, and 7% reported at least one ideological goal. In the FITSA study, the most common goal category at both measurement points was health and functioning, followed by exercise, close relationships and cultural activities in W2, and independent living and close relationships in W3. Only a small proportion of the participants did not report any personal goals, either because they felt they did not have any goals in their lives anymore or because they had already attained all of their goals.

In Study II, the changes in personal goals of older women were studied in an eight-year follow-up (Table 10). The total proportion of women reporting goals related to health and functioning decreased significantly over the follow-up. 38% of the participants who had reported goals related to health and functioning at baseline disengaged from these goals during the follow-up. However these goals were commonly adopted over years, as 60 % of those who did not report goals related to health and functioning at baseline reported at least one such goal at the follow-up. There was a substantial decrease in the proportion of women reporting goals related to exercise and to cultural activities over the years. A majority of those who had reported these goals at

TABLE 9 The personal goal categories of LISPE and FITSA studies, number of participants reporting them, and examples of their content.

LISPE (n=824)	% (n)	Example (from the LISPE data)	FITSA W2 (n=308)	% (n)
Health maintenance	**52 (427)**			
Maintaining health	32 (263)	"to stay healthy"	Health and functioning	72 (223)
Maintaining functioning	20 (165)	"to maintain functional ability"		
Healthy lifestyle	8 (68)	"to live a healthy life"	Diet / outlook	6 (19)
Mental health	5 (38)	"to stay mentally alert"	Memory	6 (17)
Recovery	**8 (69)**			
Recovery / Managing illnesses	5 (38)	"that the cancer treatment would work"	Living with symptoms / illness	6 (18)
Improving functioning	4 (34)	"to be able to move normally, as before"		
Social goals	**33 (272)**			
Family	14 (119)	"to visit children"	Close relationships	34 (105)
Meeting other people	13 (107)	"to spend time with friends"		
Helping others	6 (48)	"to support the children in their lives"	Care of others	7 (20)
Other's health and well-being	6 (45)	"a good future for our grandchildren"	Other people's health	16 (48)
Leisure-time activities	**31 (259)**			
Travel / summer cottage	15 (124)	"to travel to some place warm"	Travel	6 (18)
Hobbies at home	14 (111)	"to do handicrafts"/ "to read the newspaper every day"	Cultural activities	27 (84)
Participation in social events	6 (48)	"to participate in war veterans' events"	Social activities	13 (40)
Hobbies outside home	4 (33)	"to continue going to concerts"	Work	1 (2)
Physical activity	**24 (196)**			
Activeness in daily life	16 (133)	"gardening"	Busying oneself around the home	14 (44)
Exercise	10 (85)	"to exercise more"	Exercise	37 (115)
Daily life	**30 (246)**			
Independent living	15 (124)	"to be able to take care of myself and my home"	Independent living	23 (71)
Life as it is	9 (76)	"that life would stay as it is"		
Living arrangements	4 (32)	"to move to the city center"		
Economic issues	4 (32)	"to save money"	Economic issues	3 (10)
Ideological goals	**7 (55)**			
Character	2 (20)	"to be as good a person as possible"	Self-development	3 (8)
Common good	2 (14)	"to participate in the development of society"	Politics	1 (2)
End-of-life issues	2 (13)	"I have lost all interest in life, I'm waiting for death"		
Philosophy of life / religion	2 (12)	"to live according to God's will"	Religion	1 (3)
Other	1 (11)	"to have a dog"	Other	1 (3)
No goals	6 (51)	"I have no goals anymore" / "All my goals have been attained"	No goals	1 (2)

TABLE 10 Frequencies of older women's personal goals at baseline, at follow-up and by changes in personal goals (Study II; n=205).

Personal goal category	Baseline % (n)	Follow-up % (n)	Engaged in a goal % (n)*	Did not engage in a goal % (n)*	Disengaged from goals % (n)#	Maintained goals % (n)#	p-value¤
Health and functioning	74 (152)	62 (127)	60 (32)	40 (21)	38 (57)	63 (95)	.011
Exercise	38 (78)	11 (22)	6 (8)	94 (119)	82 (64)	18 (14)	<.001
Close relationships	36 (74)	28 (57)	27 (35)	73 (96)	70 (52)	30 (22)	.086
Cultural activities	28 (57)	12 (24)	9 (13)	91 (135)	81 (46)	19 (11)	<.001
Independent living	24 (49)	42 (86)	40 (63)	60 (93)	53 (26)	47 (23)	<.001

* Percentage of those who did not have goals in the category at baseline

Percentage of those who had at least one goal in the category at baseline

¤ McNemar test for the significance of change in the total proportion of participants reporting personal goals in a category

Note. Engaged in a goal, refers to those who did not have a goal in the category at baseline but had at least one goal in the category at follow-up; did not engage in a goal, refers to those who did not have a goal in the category at either baseline or follow-up; disengaged from goals, refers to those who had a goal in the category at baseline but did not at follow-up; maintained goals, meaning those who had a goal in the category at both baseline and follow-up.

baseline disengaged from them during the follow-up (82% for exercise and 81% for cultural activities). Also, only a few of the women who did not report these goals at baseline reported them at follow-up (6%/ 9% respectively). Correspondingly, goals related to close relationships and to independent living were quite commonly abandoned (70% and 53%, respectively), but many people also adopted these goals over the years (27% and 40%, respectively). Independent living was the only goal category in which the proportion of women reporting goals increased during the follow-up.

The associations between the personal goal dimensions of the LISPE study are reported in Table 11. Most notably, goals related to leisure-time activities were associated with physical activity goals. On the contrary, health-related goals and goals related to daily life were reported less often by people with goals related to physical activity or leisure-time activities. The associations between the goal categories of the FITSA study were similar: exercise-related goals coincided with goals related to cultural activities (OR 2.26, 95% CI 1.26-4.05), whereas the odds for reporting exercise-related goals were lower among those with goals related to health and functioning (OR 0.30, 95% CI 0.16-0.54), independent living (OR 0.14, 95% CI 0.06-0.32), and other people's health (OR 0.34, 95% CI 0.14-0.81) when compared to those who did not report goals in these categories.

TABLE 11 Associations between the goal dimensions of the LISPE study.

	Health maintenance	Recovery	Social goals	Leisure-time activities	Physical activity	Daily life	Ideological goals
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Health maintenance	--	**0.47 (0.28-0.80)**	**1.34 (1.00-1.84)**	**0.68 (0.49-0.93)**	**0.59 (0.41-0.83)**	0.76 (0.56-1.04)	**0.51 (0.28-0.92)**
Recovery	**0.47 (0.28-0.79)**	--	0.86 (0.50-1.49)	**0.52 (0.28-0.95)**	1.36 (0.76-2.45)	0.72 (0.40-1.29)	0.56 (0.17-1.88)
Social goals	**1.36 (1.00-1.84)**	0.87 (0.50-1.50)	--	0.97 (0.69-1.35)	1.14 (0.80-1.63)	**0.71 (0.51-1.00)**	1.63 (0.93-2.88)
Leisure-time activities	**0.68 (0.49-0.93)**	**0.53 (0.29-0.96)**	0.97 (0.70-1.35)	--	**2.96 (2.09-4.18)**	**0.42 (0.29-0.62)**	0.89 (0.47-1.69)
Physical activity	**0.58 (0.41-0.82)**	1.37 (0.76-2.44)	1.14 (0.79-1.63)	**2.95 (2.09-4.17)**	--	**0.56 (0.37-0.85)**	1.21 (0.62-2.33)
Daily life	0.77 (0.56-1.05)	0.73 (0.41-1.31)	**0.71 (0.51-1.00)**	**0.42 (0.29-0.62)**	**0.57 (0.38-0.85)**	--	1.03 (0.56-1.91)
Ideological goals	**0.52 (0.29-0.92)**	0.57 (0.17-1.91)	1.63 (0.93-2.87)	0.93 (0.50-1.73)	1.23 (0.63-2.38)	1.01 (0.54-1.88)	--

OR = Odds ratio
SD = Standard Deviation
Note. All the predictor variables, adjusted for age and sex, were included in the models simultaneously; Statistically significant associations are bolded.

5.3 Resources in life and personal goal content in old age (Studies I, II)

Below are reported the cross-sectional associations between resources in life and personal goal content (Study I; Table 12) and the longitudinal associations between mobility limitation and changes in personal goal content (Study II; data not shown). Although the categorization of personal goals differs in the LISPE and FITSA studies, all the results are reported under the goal dimensions of the LISPE study.

*Reporting any personal goals. T*he multivariate logistic regression model showed that, in the LISPE study, women were two-times more likely to report personal goals in any of the goal dimensions when compared to men. Also, living with someone increased the odds for reporting any personal goals.

Health maintenance goals. The participants of the LISPE study who reported having no or minor difficulties in walking two kilometers were more likely to report health maintenance goals when compared to those with major walking difficulties. Moreover, good perceived economic situation decreased the odds for reporting these goals. In the longitudinal analysis of the FITSA data, incident difficulties in climbing stairs increased the odds for disengaging from goals related to health and functioning (OR 2.46, 95% CI 1.10 – 5.51).

Recovery goals. In the LISPE study, younger age, more years of education, and good perceived economic situation increased the odds for reporting recovery goals. On the contrary, good/very good self-rated health and having no or minor difficulties in walking two kilometers decreased the odds for reporting these goals.

Social goals. In the LISPE study, women were two times more likely to report social goals than men. Living with someone and reporting no walking difficulties increased, and frequent meetings with relatives decreased, the odds for reporting these goals. In the FITSA study, those who encountered difficulties in using public transportation over the follow-up were more likely to engage in a new goal related to close relationships (OR 2.79, 95% CI 1.18 – 6.58) over the years than those who did not encounter such difficulties.

Leisure-time activity goals. In the LISPE study, reporting no difficulties in walking two kilometers increased, and meeting relatives frequently decreased, the odds for reporting goals related to leisure-time activities. In the FITSA study, higher age decreased the odds for engaging in new goals related to cultural activities over the follow-up (OR 0.74, 95% CI 0.62 – 0.87). Moreover, incident difficulties in walking two kilometers increased the odds for disengaging from goals related to cultural activities (OR 7.68, 95% CI 1.26 – 46.74).

TABLE 12 Multivariate associations of personal characteristics, and socio-economic, social, and health resources with personal goal content (Study I).

Resources in life	At least one goal OR (95% CI)	Health maintenance OR (95% CI)	Recovery OR (95% CI)	Social goals OR (95% CI)	Leisure-time activities OR (95% CI)	Physical activity OR (95% CI)	Daily life OR (95% CI)	Ideological goals OR (95% CI)
Personal characteristics								
Gender (female)	**2.21 (1.13-4.33)**	1.08 (0.78-1.49)	1.83 (0.98-1.44)	**2.16 (1.51-3.07)**	1.22 (0.86-1.73)	0.83 (0.57-1.20)	1.21 (0.85-1.72)	1.56 (0.77-3.14)
Age								
75-79 y	1.85 (0.83-4.12)	1.42 (0.95-2.11)	**3.16 (1.35-7.39)**	1.06 (0.69-1.63)	1.02 (0.66-1.57)	0.99 (0.62-1.59)	0.91 (0.59-1.41)	0.50 (0.23-1.08)
80-84 y	1.50 (0.74-3.08)	1.11 (0.75-1.63)	2.23 (0.97-5.12)	1.04 (0.68-1.60)	1.05 (0.68-1.62)	0.91 (0.57-1.46)	0.95 (0.62-1.45)	0.61 (0.29-1.27)
85-90 y	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Socio-economic resources								
Years of education (at least 8)	1.59 (0.85-2.96)	0.99 (0.73-1.36)	**2.74 (1.40-5.38)**	1.04 (0.75-1.46)	1.39 (0.99-1.96)	1.40 (0.96-2.04)	1.25 (0.89-1.76)	1.65 (0.85-3.20)
Economic situation (good or very good)	0.77 (0.42-1.42)	**0.66 (0.49-0.89)**	**1.97 (1.14-3.40)**	1.06 (0.78-1.45)	1.00 (0.73-1.37)	0.98 (0.70-1.38)	0.95 (0.69-1.30)	1.24 (0.69-2.23)
Social resources								
Living with someone	**2.18 (1.07-4.45)**	1.06 (0.77-1.46)	1.54 (0.85-2.79)	**1.41 (1.00-1.98)**	1.22 (0.86-1.73)	1.03 (0.71-1.50)	0.97 (0.68-1.38)	0.85 (0.44-1.67)
Frequent meetings with relatives	0.83 (0.43-1.60)	1.11 (0.82-1.50)	0.76 (0.44-1.32)	**0.71 (0.51-0.97)**	**0.72 (0.53-1.00)**	1.05 (0.71-1.49)	0.82 (0.59-1.13)	0.84 (0.46-1.52)
Frequent meetings with friends	0.96 (0.52-1.77)	0.93 (0.70-1.25)	1.36 (0.78-2.38)	1.03 (0.75-1.41)	0.99 (0.72-1.37)	0.93 (0.66-1.32)	0.91 (0.66-1.25)	**2.42 (1.24-4.71)**

Health resources								
MMSE score (at least 24)	1.64 (0.83-3.23)	1.11 (0.76-1.64)	0.79 (0.38-1.65)	0.91 (0.60-1.37)	1.34 (0.86-2.10)	1.42 (0.86-2.35)	1.47 (0.94-2.29)	1.39 (0.59-3.26)
Self-rated health								
Good or very good	0.89 (0.26-3.00)	1.62 (0.89-2.95)	**0.31 (0.11-0.89)**	1.21 (0.62-2.36)	1.70 (0.82-3.52)	2.73 (0.99-7.52)	0.73 (0.39-1.35)	0.74 (0.26-2.11)
Moderate	0.80 (0.28-2.32)	1.20 (0.70-2.05)	1.17 (0.53-2.59)	1.38 (0.75-2.54)	1.79 (0.91-3.50)	**3.51 (1.33-9.24)**	0.63 (0.37-1.09)	0.55 (0.22-1.37)
Poor or very poor	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Difficulties in walking 2 km								
No difficulties	1.45 (0.62-3.38)	**1.62 (1.05-2.50)**	**0.25 (0.12-0.52)**	**1.74 (1.08-2.80)**	**1.68 (1.03-2.75)**	**2.15 (1.22-3.79)**	0.86 (0.54-1.36)	0.62 (0.27-1.47)
Minor difficulties	0.80 (0.34-1.85)	**1.59 (1.00-2.52)**	**0.39 (0.19-0.82)**	0.97 (0.58-1.63)	1.18 (0.69-2.00)	1.66 (0.90-3.06)	0.73 (0.44-1.20)	0.69 (0.28-1.70)
Major difficulties / unable	ref.	**ref.**	**ref.**	ref.	ref.	ref.	ref.	ref.

OR = Odds Ratio

CI = Confidence Interval

Note. A separate multivariate logistic regression model for each goal dimension; all the predictor variables included in the models simultaneously; statistically significant associations are bolded.

Physical activity goals. LISPE participants who rated their health as moderate were over three times more likely to report physical activity goals compared to those who rated their health as poor/very poor. For those who had no difficulties in walking two kilometers, the odds for reporting these goals were two times higher when compared to those with major walking difficulties. Longitudinally, in the FITSA study, incident difficulties in walking two kilometers decreased the odds for engaging in new goals related to exercise (OR 0.05, 95% CI 0.01 – 0.39).

Daily life goals. In the LISPE study, no significant associations were observed between the resource variables and personal goals related to daily life. Longitudinally, in the FITSA study, higher age decreased the odds for disengaging from goals related to independent living (OR 0.81, 95% CI 0.66 – 0.99).

Ideological goals. In the LISPE study frequent meetings with friends correlated with ideological goals.

5.4 Personal goals and exercise activity (Study III)

Those participants in Study III (37%) who reported exercise-related personal goals were younger (mean age 70.7 y SD ± 2.9 vs. 71.5 y ± 3.5, p=.048), more often perceived their economic situation as good (35.7% vs. 21.2%, p=.012), and less often reported having difficulties in walking two kilometers (24.3% vs. 39.9%, p=.005) than those who did not report such goals. Among the participants, 26% were categorized as engaging in high exercise activity at baseline. The proportion of women with high exercise activity at baseline was significantly higher among those who reported exercise-related personal goals than those who did not report such goals (43% vs. 16%, p<.001). Women with personal goals related to cultural activities also more often had high exercise activity compared to those with no such goals (37% vs. 21%, p=.006). Exercise activity did not differ significantly based on reporting vs. not reporting goals in the other goal categories. Among the participants, 15% were categorized as engaging in continuously high exercise activity at follow-up. For 12% of the participants exercise activity decreased from high to low, for 11% it increased from low to high, and for 62% it remained low. Women who reported exercise-related personal goals more often also reported continuously high exercise activity (23% vs. 9%, p=.003) compared to women not reporting goals in the category. There were no differences in the proportion of women engaging in continuously high exercise activity vs. not engaging based on reporting goals in the other goal categories.

Table 13 shows the associations between personal goals and high / continuously high exercise activity. Reporting exercise-related personal goals quadrupled the odds for engaging in high exercise activity at baseline, and the association remained strong in the adjusted model. Reporting goals related to cultural activities doubled the odds for engaging in high exercise activity, but

TABLE 13 Associations between personal goals and high exercise activity at baseline and continuously high exercise activity at the 8-year follow-up.

Personal goal category	High exercise activity, baseline (n=308)		Continuously high exercise activity, follow-up (n=239)	
	Model 1* OR (95% CI)	Model 2# OR (95% CI)	Model 1* OR (95% CI)	Model 2# OR (95% CI)
Exercise	**4.19 (2.36 – 7.43)**	**4.14 (1.92 – 8.92)**	**2.97 (1.35 – 6.52)**	**3.45 (1.25 – 9.53)**
Health and functioning	0.77 (0.42 – 1.40)	1.18 (0.57 – 2.45)	0.87 (0.37 – 2.06)	0.69 (0.24 – 1.99)
Close relationships	0.80 (0.43 – 1.49)	0.88 (0.43 – 1.81)	1.01 (0.43 – 2.37)	0.83 (0.34 – 2.01)
Cultural activities	**2.14 (1.25 – 3.68)**	1.76 (0.87 – 3.59)	1.03 (0.47 – 2.23)	0.62 (0.26 – 1.47)
Independent living	0.65 (0.34 – 1.25)	1.33 (0.60 – 2.98)	0.89 (0.37 – 2.12)	1.25 (0.46 – 3.43)
Other people's health	0.84 (0.41 – 1.70)	1.43 (0.56 – 3.69)	0.84 (0.30 – 2.38)	1.30 (0.37 – 4.52)
Busying oneself around the home	1.82 (0.89 – 3.72)	1.33 (0.51 – 3.45)	0.72 (0.24 – 2.17)	0.45 (0.12 – 1.78)
Social activities	1.68 (0.83 – 3.40)	1.35 (0.55 – 3.31)	1.44 (0.56 – 3.68)	1.38 (0.51 – 3.79)

OR = Odds ratio
CI = Confidence Interval
* Bivariate model adjusted for age
# Multivariate models; all the variables are included in the model simultaneously, adjusted for age, years of education, economic situation, CES-D -score (Center for Epidemiologic Studies Depression Scale), self-rated health and difficulties in walking 2 km.
Note. Exercise activity high at baseline means quite a lot or a great deal of self-reported exercise activity; Exercise activity continuously high means the amount of self-reported exercise activity was high both at baseline and at follow-up; Statistically significant associations are bolded.

this association was attenuated in the adjusted model. Women who reported both exercise-related and cultural activity goals were six times more likely to have high exercise activity (OR 6.00, 95% CI 2.86 – 12.60; bivariate age-adjusted logistic regression model) compared to those who did not report either of these goals. Reporting both exercise-related goals and goals related to busying oneself around the home similarly increased the odds for high exercise activity (OR 5.86, 95% CI 2.20 – 15.59; bivariate age-adjusted logistic regression model). The other personal goals were not associated with exercise activity. At the eight-year follow-up, women who had reported exercise-related goals at baseline were three times more likely to have continuously high exercise activity, and the association was even stronger in the adjusted model. Other personal goals did not correlate with continuously high exercise activity.

5.5 Personal goals and life-space mobility (Study IV)

The average life-space mobility composite (LSMC) score among the LISPE participants was 64.3 (± 20.5) at baseline, 62.6 (± 22.0) at the first follow-up, and 61.7 (± 21.9) at the second follow-up. Based on the GEE -model, the LSMC score was somewhat higher among participants who reported at least one personal goal in any of the 25 goal categories of the LISPE study than those who did not report any personal goals (marginal mean ± SD: 65 ± 0.6 vs. 61 ± 2.6; p=.06), and the difference remained similar throughout the two-year follow-up (63 ± 0.6 vs. 59 ± 2.6 at the first follow-up and 61 ± 0.6 vs. 57 ± 2.5 at the second follow-up; group x time interaction effect p=.994; fully adjusted model).

The time effect of the fully adjusted GEE -model with 11 goal categories as separate predictor variables was not significant (p=0.981), indicating no significant changes in the average LSMC score over the study years. The difference in the life-space mobility score between those who reported vs. did not report goals related to maintaining functioning was not significant at baseline. Those who reported these goals had a rather stable LSMC score across the follow-up, whereas the score decreased significantly among those who did not report such goals. At baseline, the LSMC score was higher among participants with goals related to activeness in daily life, exercise, and mental health than among to those who did not report any goals in the respective goal categories. The differences between the groups remained over the two-year follow-up for goals related to exercise and mental health, and over the one-year follow-up for goals related to activeness in daily life. Those who reported goals related to improving functioning had a lower LSMC score at baseline than those with no such goals, and the difference between the groups remained over the two follow-up years (Table 14).

TABLE 14 Goal categories jointly predicting changes in life-space mobility score in the GEE-model.

					GEE-model p-values	
		Baseline	Follow-up 1	Follow-up 2		Group X Time
		M ± SE	M ± SE	M ± SE	Group	
Maintaining functioning	Yes	67 ± 3.0	65 ± 3.3	66 ± 3.5	0.075	0.001
	No	66 ± 2.7	64 ± 3.0	61 ± 3.4		
Activeness in daily life	Yes	68 ± 3.0	66 ± 3.2	64 ± 3.6	0.048	0.443
	No	65 ± 2.8	63 ± 3.1	63 ± 3.4		
Travel / summer cottage	Yes	66 ± 3.0	65 ± 3.3	63 ± 3.7	0.886	0.515
	No	67 ± 2.7	64 ± 3.0	64 ± 3.3		
Hobbies at home	Yes	67 ± 3.0	65 ± 3.2	64 ± 3.5	0.671	0.312
	No	66 ± 2.7	65 ± 3.0	63 ± 3.5		
Family	Yes	66 ± 3.0	65 ± 3.2	65 ± 3.6	0.847	0.287
	No	67 ± 2.8	65 ± 3.1	63 ± 3.4		
Meeting friends	Yes	69 ± 3.0	65 ± 3.4	64 ± 3.7	0.185	0.054
	No	64 ± 2.7	65 ± 2.9	63 ± 3.3		
Exercise	Yes	68 ± 3.1	67 ± 3.3	66 ± 3.6	0.007	0.766
	No	65 ± 2.7	63 ± 3.0	61 ± 3.4		
Helping others	Yes	67 ± 3.4	66 ± 3.8	65 ± 4.2	0.435	0.775
	No	66 ± 2.5	64 ± 2.8	63 ± 3.0		
Mental health	Yes	69 ± 3.2	67 ± 3.6	65 ± 4.1	0.030	0.762
	No	64 ± 2.7	63 ± 3.0	62 ± 3.1		
Recovery/ managing illnesses	Yes	64 ± 3.4	63 ± 4.0	62 ± 4.1	0.076	0.680
	No	69 ± 2.5	67 ± 2.7	65 ± 3.2		
Improving functioning	Yes	64 ± 3.8	62 ± 4.2	60 ± 4.9	0.045	0.917
	No	70 ± 2.4	68 ± 2.7	67 ± 2.7		

M = marginal mean
SE = Standard error of marginal mean
Note. GEE -model; adjusted for age, sex, years of education, economic situation, number of chronic conditions and difficulties in walking two kilometers.

6 DISCUSSION

Based on the results of this study, goals related to health are the most typical goals in old age, followed by social goals and goals related to different activities. Health maintenance goals correlated with good health resources, while recovery goals were more often reported by people with poor health and functioning. Participants with good walking ability more often reported goals related to physical and leisure-time activities, as well as social goals, when compared to those with walking difficulties. Longitudinally, there was a substantial decrease in the proportion of participants reporting goals related to exercise and cultural activities. Exercise-related goals correlated with higher exercise activity both cross-sectionally and longitudinally. Having other activity-related goals supported exercise-related goal pursuit, while goals related to health and independent living interfered with strivings toward physical and leisure-time activities. Furthermore, goals related to mental and physical activity correlated with higher life-space mobility. Also, striving toward maintaining functioning resulted in the maintenance of higher life-space mobility over the study years.

This study showed that older people are active in shaping their lives, as they endorse a rich variety of individual personal goals. A new coding scheme for categorizing older people's goals was developed. This enabled the distinction to be drawn between maintenance- and improvement-oriented health goals, thereby more precisely reflecting the strivings of older people with different health resources. Further, this study provided empirical evidence for the theories of developmental regulation (Baltes & Baltes 1990; Brandtstädter 2009; Heckhausen et al. 2010), since goal engagement in old age was found to depend on the resources older people have, and loss of resources was associated with goal disengagement. Moreover, since activity-related personal goals were shown to promote exercise activity and help older people to maintain higher life-space mobility, it may be that having personal goals slows down the disablement process and serves as a means for active aging.

6.1 Resources, personal goals and goal adjustment in old age

Being able to participate in activities according to one's personal goals is a central feature of active aging (WHO 2002). It is commonly assumed that older people no longer have goals in their lives. The first finding of the study was that they do. This indicates that older people are active in steering their lives by setting themselves personal goals. Further, the goals older people reported were highly individualized and diverse, as shown by the variety of different goals in each of the goal categories. Although health-related goals were most typically reported by the participants of this study, a large proportion of the older people also had strivings toward engaging in social, physical, or other leisure-time activities. This demonstrates that many older people want to age actively, and, instead of just passively adjusting to aging, they strive for meaningful participation in the community also in their later years of life.

The association of health resources with personal goal setting was the most evident with respect to goals related to leisure-time activities and physical activity. Most notably, walking difficulties restricted activity-related goal setting, and often led to disengagement from cultural activity goals. This may be explained by earlier findings on health problems decreasing the motivation to participate in leisure-time activities (Hess et al. 2012). Also, declining health and functioning may force people to focus on managing daily life instead of striving for recreation through activity participation (Schindler & Staudinger 2008). In previous research, better physical functioning has been associated with more leisure-time activity goals (Frazier et al. 2002), and good self-rated health with strivings for primary control related to leisure-time activities (Menec et al. 1999). Mobility is a key ability for maintaining community participation (Allman et al. 2006), and people with mobility limitation may start avoiding situations where they feel that they lack competence, or activities which they consider as imposing too much strain (Frazier et al. 2002; Rush et al. 2011). This may result in reduced goal setting for participation in physical or other leisure-time activities. Based on these results, it seems that although an active aging policy should include all aging people (WHO 2002), lack of health resources may restrict some older people's strivings for activity participation in old age.

The associations found between resources in life and personal goal content, as along with the longitudinal results on changes in personal goals, are supportive of the social ecological model of personality (Little 2007, 2014) by indicating that several personal and contextual features correlate with personal goal setting. They are also in line with the theories of developmental regulation, which emphasize the effect of resources on personal goal setting in old age. The changes in older people's personal goal content with increasing age, and the finding that these changes were often related to mobility decline, exemplify the notion of loss-based selection in the SOC -model (Baltes & Baltes 1990; Freund et al. 2009) and accommodation in the dual-process model of developmental regulation (Brandtstädter et al. 2009) – both of which are seen as central

methods for adjusting to age-related changes (Brandtstädter et al. 2015; Freund et al. 2009). According to the motivational theory of lifespan development (Heckhausen et al. 2010), disengaging from active life goals represents compensatory secondary control, which in turn could support the pursuit of other, alternative, goals in life. In case of functional decline, it is essential to avoid futile battles for unachievable goals, and concentrate on goals that help in maintaining one's current functional status (Heckhausen et al. 2013). Women who had disengaged from their activity-related goals over the years probably did not have enough resources to maintain the pursuit of those goals. It may be that disengaging from goals in such a situation benefited their psychological well-being (Jopp & Smith 2006; Wrosch et al. 2003). However, by adjusting these goals so that they are compatible with current resources, or by using compensatory methods (Baltes & Baltes 1990; Heckhausen et al. 2013), it might have been possible to continue strivings for activity participation. This could have yielded future benefits in terms of better health and functioning.

The importance of health resources in old age is also evident in the result that the most commonly reported personal goals among the participants of this study were related to health and functioning, most notably to maintaining current health status and functional ability. Since these goals were more often reported by people with good health resources, the result is in line with the lines-of-defense model – a domain-specific application of the motivational theory of life-span development. The model states that engaging in health-related goals with the aim of avoiding diseases and functional loss is the first line-of-defense in old age, when health and functioning are relatively good, but nevertheless threatened by the aging process. In such a situation, engaging in goals related to maintaining current health and functioning is the primary focus of developmental regulation (Heckhausen et al. 2010, 2013). Moreover, it has been theorized that the developmental tasks of a person's current life phase are reflected in his/her personal goals (Heckhausen 1999; Salmela-Aro 2009). Adjusting to losses in physical capability is one of the most important developmental tasks in old age (Havighurst 1972; Peck 1968), and strivings for maintaining the current situation a sign of positive old age development (Baltes et al. 1999b). The high frequency of health-related goals in this study stresses the importance of managing one's health situation as a central developmental challenge in old age.

The high prevalence of health-related goals among older people has previously been explained by weakening health status (Frazier et al. 2002; Lapierre et al. 1997). However, in previous studies, different health-related goals have been classified under the same goal category (e.g., Feldt et al. 2012; Lawton et al. 2002). In the coding scheme developed for the LISPE study, different health-related goals were first divided into five categories and then, condensed into two goal dimensions based on whether they expressed strivings for maintaining or for improving current health and functional status. The results showed that goals related to health maintenance were more often reported by people with good health resources, whereas poor health resources were associated with recovery

goals. In the longitudinal analysis, a slight decrease in goals related to health and functioning was observed, and the likelihood for disengaging from these goals was higher among those with mobility limitation. It has been stated that health-related goals may rather reflect rumination over health issues than active strivings for health (Smith & Freund 2002). Based on the current results, it seems that health maintenance goals are set in the context of a relatively good health, when maintaining status quo in the future is the primary aim. Consequently, goals related to maintaining health and functioning may be abandoned when functioning has started to decline.

The emphasis on health maintenance goals over health improvement goals is an example of maintenance orientation, which is typically emphasized in old age (Ebner et al. 2006; Freund & Ebner 2005). However, since improvement orientation is also evident in old age (Smith & Freund 2002), it may be that a maintenance-improvement focus is more dependent on the resources one has, i.e., with sufficient resources older people as well as younger ones may strive for improvement (Ebner et al. 2006). It has been reported that current illnesses are typically reflected in the personal goals people report (Janse et al. 2015; Cotrell & Hooker 2005). In this study, illness-related goals were included in the recovery goals category. These goals were more frequently reported by people who experienced health problems and needed to improve their current situation. However, recovery goals also correlated with younger age and better socio-economic resources. Thus, it seems that striving for improvement requires resources in other areas of life, and that those in a more disadvantageous position do not set such goals for themselves. As noted earlier (Gerstorf & Ram 2009), this result indicates that to enable strivings for improvement when health and functioning have declined, other kinds of resources are needed. These results highlight the need for supporting older people with fewer resources to improve their situation instead of settling for a continued decline in health and functioning.

Social goals were among the most common goals reported by the participants of this study, and the longitudinal analysis showed no significant decrease in the prevalence of these goals. These findings may be explained by the notion that striving for emotional closeness is important for people in all phases of life (Sheldon & Kasser 2001). Further, the socioemotional selectivity theory states that goals are selected to fulfill the need for emotional closeness, especially in old age, when the future time perspective is limited (Fung & Carstensen 2004). The shortening of the future lifespan has also empirically been associated with a preference for intimacy-related personal goals (Brandtstädter et al. 2010). Moreover, in previous studies, older people have reported more goals related to generativity (i.e., helping others) than younger adults (Hoppman & Blanchard-Fields 2010; Penningroth & Scott 2012; Sheldon & Kasser 2001), a tendency that may also have contributed to the high frequency of social goals in this study. However, the socioemotional selectivity theory also stresses that because older people typically value emotionally meaningful goals, strivings for more shallow relationships and a wide social

network may be abandoned (Carstensen et al. 2003). Based on this study, this narrowing of social goals may become relevant when walking ability has started to decline. Again, as lack of health resources may restrict older people from setting themselves social goals, the results indicate that good health resources may be a prerequisite for active aging.

Goals related to daily life did not correlate with any of the resource variables in this study, although in the longitudinal analysis higher age decreased the likelihood of disengaging from goals related to independent living. This indicates that goals related to independent living are prioritized with increasing age, and that older people select more goals related to it (Baltes & Baltes 1990). This may also indicate that with increasing age, or with functional decline, the focus of developmental regulation shifts from maintaining health and functioning to maintaining the capability to conduct everyday activities, which may be achieved, for example by striving to regain earlier functional status (Heckhausen et al. 2013). This is evident in the result that goals related to recovery were more frequently reported by people with poor health resources. Otherwise it seems that living independently and continuing life as it is are goals that older people engage in regardless of their resources. Since age did not show many associations with goal setting in this study, it can be concluded that differences in goal content in old age derive more from differences in personal characteristics and life resources other than age, most notably from health resources, as noted previously by Ebner et al. (2006). This was most evident in the result that goals which may be difficult to attain for people with declined mobility (health maintenance, social relations, leisure-time activity, and physical activity) were more often reported by people with good walking ability.

The value of goal disengagement in old age has been emphasized as it supports the pursuit of other alternative and more feasible goals (Heckhausen et al. 2010). Although goal disengagement seems to be relatively common in old age, and although it may also be beneficial for psychological well-being (e.g., Wrosch et al. 2003), the benefits of active goal engagement should also be noted. Primary control striving, i.e., goal engagement, is emphasized as a central feature in developmental regulation in old age (Heckhausen et al. 2010). For successful development, it is central to know what is worth striving for, and what is better to abandon (Heckhausen et al. 2013). It may be that in old age, activity-related goals are not considered essential, and they are more easily abandoned when resources decline. When goals are abandoned due to resources losses, it is important that they have the possibility of replacement by other meaningful goals (Wrosch et al. 2003). Research has indicated that in the best case scenario, goal adjustment and disengagement are accompanied by selecting new goals and tenaciously striving for existing goals (Bailly et al. 2012; Kelly et al. 2013; Offerman et al. 2010; Wrosch et al. 2003). Having goals for the future has been associated with better life satisfaction among older people (Wrosch et al. 2005). Although some of the participants in this study had abandoned their activity-related goals, and some types of goals were less

reported by people with fewer resources, only a minor proportion of the participants had no goals in their lives. This is important, since personal goals may give one reason to go on, and inject meaning into one's life, even in a situation where age-related resource losses challenge daily life (Williams 1981). By encouraging older people to continue in goal engagement, the active aging policy (WHO 2002) could also be better realized in aging societies.

6.2 Personal goals in promoting activity in old age

As was expected based on the social ecological model of personality (Little 2007, 2014), personal goal setting was observed to correlate with activity participation, i.e., with exercise activity and life-space mobility. Since activity-related goals were found to promote participation in exercise, it is reasonable to assume that significant health benefits might also be obtained through goal engagement. The results of this study also highlight the importance of older people's own strivings toward maintaining their personal functioning, since this may also help them to maintain higher life-space mobility. This, in turn, might even improve quality of life in old age (Rantakokko et al. 2015b). Further, by showing that personal goals relate to activity participation, these results indicate that personal goal setting could help in attenuating functional decline with aging and thus slow down the disablement process (Verbrugge & Jette 1994). Therefore, also the possibility for active aging may be increased by setting and pursuing personal goals.

Quite a large proportion of the participants reported personal goals related to exercise or other physical activities. This corresponds to a recent finding that the most favored activities of older people are physical (Szanton et al. 2015). Personal goals inspire people to act according to those goals (Cross & Markus 1991; Deci & Ryan 2000), as was evident in this study, where exercise-related personal goals correlated with higher exercise activity both cross-sectionally and longitudinally. Since engagement in exercise-related goals indicates primary control striving (Heckhausen et al. 2010), the results of this study are in line with those of a previous study, where primary control strategies were associated with higher physical activity levels among older people (Hamm et al. 2014). Based on the self-determination theory (Deci & Ryan 2000), maintaining a behavior requires that a person has internalized it and feels that it is self-determined, i.e., based on autonomous motivation. The present results may also be explained by the notion that setting exercise-related personal goals is most likely an indication of an autonomous motivation for exercise, as the latter has been found to be associated with more participation in physical activity and exercise (Chatzisarantis & Hagger 2009; Fortier & Kowal 2007; Vansteenkiste et al. 2004).

At any given moment, people have many different personal goals in their lives. These goals can either support or hinder each other (Little 1983). It might also be possible to increase exercise engagement by striving for other activity-

related goals than exercise alone (Riediger & Freund 2004). This was clearly observed in the current study, as having goals related to cultural activities or busying oneself around the home, in addition to exercise-related goals, facilitated exercise engagement. Further, physical activity/exercise goals coincided with goals related to leisure-time activities. Since these active goals were more often reported by people with better health resources, it may be that older people with functional decline consider physical activity and exercise engagement as demanding excessive strain (Rush et al. 2011), and do not set goals related to these. This was also clearly shown by the substantial decrease in the prevalence of exercise-related goals during the eight-year follow-up. Strikingly, none of the women, who had developed walking difficulties during the follow-up had set themselves new exercise-related goals. Thus, it is evident that functional problems may become a barrier to exercise engagement (Gretebeck et al. 2007). This is alarming, since engaging in at least some level of exercise would be the best way to prevent further disability (Rantanen 2013). Engaging in health behaviors such as physical activity requires a belief in one's ability to do so (Gebhardt & Maes 2001). As self-efficacy has been associated with higher physical activity levels among older people (White et al. 2012), it may be that experiencing difficulties in walking easily leads to not striving for exercise as a goal. Therefore, declining mobility may cause a vicious cycle of increasing functional decline, eventually culminating in disability. This is another instance of the notion that health resources may be a prerequisite for active aging (Paúl et al. 2012).

It may seem surprising that those reporting health maintenance goals and goals related to independent living mostly did not report exercise-related goals. This apparent anomaly may be explained by the fact that high investment in prioritized personal goals may make it difficult to engage in certain other goals (Heckhausen et al. 2010). Based on the present results, it may be that when strivings are targeted at maintaining health or managing daily life, this does not leave enough resources for striving for exercise-related goals. However, it would be important to be able to modify one's exercise goals so that they are compatible with one's resources. Older people with mobility decline should be encouraged to set personal goals for continuing physical activity in accordance with their physical capacities. Since simply going outside the home may increase the physical activity levels of older people (Portegijs et al. 2015), significant effects might be obtained by pursuing personal goals related to participation in any activities or social relations that cannot be engaged in at home. This could prevent further functional decline and increase the possibilities for active aging (WHO 2002).

Participation outside the home and interest in engaging in different activities is reflected in a person's life-space mobility (Barnes et al. 2007). Thus, the present results that personal goals related to activeness in daily life, exercise, and staying mentally alert were associated with higher life-space mobility were wholly reasonable. Participation restriction increases with old age (Wilkie et al. 2006), and is strongly associated with poor health and disability (Wilkie et al.

2007). However, the present analyses were adjusted for indicators of health and functioning, and thus demonstrate that regardless of poor health resources, participation in society can be increased by relevant goal setting. The course of development in old age is typically towards losses (Baltes 1987), as shown by the fact that life-space mobility typically decreases with aging (Allman et al. 2006; Barnes et al. 2007). Therefore, the result that goal engagement predicted maintenance of a higher life-space mobility is a positive sign. It has been thought that personal goals could serve as a control strategy through which older people could avoid further disability, even when encountering functional limitations (Heckhausen et al. 2013; Verbrugge & Jette 1994). As goals related to maintaining functioning predicted the maintenance of higher life-space mobility over the follow-up years, this study provided evidence on the protective effect of personal goal pursuit during the disablement process. This is somewhat contradictory to a previous study in which goal engagement actually predicted poorer health for older people with chronic diseases (Hall, Chipperfield et al. 2010). However, the present results are in line with the notion that life-space mobility is not defined wholly by physical capability, but also by psycho-social factors (Barnes et al. 2007; Portegijs et al. 2014b). These results also show that active aging may be promoted through older people's own strivings toward maintaining good functioning and participation in different activities.

This study emphasizes the relevance of goal engagement for maximizing physical functioning and physical well-being in old age, first, by indicating that in addition to exercise-related personal goals, other activity-related goals may also support exercise activity, and, secondly, by the relationships observed between personal goals and life-space mobility. The results also showed that active goal engagement depends on the resources one has in life, most notably on health and functioning. Therefore, it is emphasized that to promote active aging in societies, efforts should be targeted at health promotion and the delaying of functional decline with aging. However, active aging is not merely a physical effort, but is also affected by psychological and social factors (Paúl et al. 2012). Hence, the value of goal engagement in active aging should not be understated.

In conclusion, the results of this study emphasize the presence and benefits of goal engagement in old age. The best possible results in terms of both physical and psychological health in old age might be obtained by tenaciously striving for valued life goals and being able to disengage from goals that are impossible to attain (Kelly et al. 2013). This corresponds to the importance of striking a balance between activeness and slowing down as one of the developmental tasks of old age (Havighurst 1972; Hutteman et al. 2014). It would be important, for example, not to totally abandon exercise-related goals when mobility starts to decline, but instead to modify them. Since difficulties in walking longer distances represents an early phase in the disablement process, setting and pursuing personal goals when experiencing such difficulties might help older people to maintain functional status and slow down the onset of disability (Heckhausen et al. 2013).

The view of old age as a time of adaptation to age-related losses may cause older people to give up too easily. Active aging policies counteract these ageist views by turning the focus on the value older people bring to societies with their active participation in the community (Walker 2002). Through focusing on older people's personal goals and the relations of these goals to activity and community participation, this study emphasized that older people are agents who embrace a rich variety of personal goals in their lives. Moreover, through their active strivings, older people are able to continue their community participation in accordance with the framework of active aging (WHO 2002).

6.3 Methodological considerations

This study used an open-ended question (the PPA Elicitation Matrix) to elicit the personal goals older people have in their lives at the moment of the measurements. Using this method enabled the collection of authentic and individual goals across a widest possible range of contents (Little & Gee 2007). Preceding the collection of datasets utilized in this study, a pilot questionnaire was constructed with a purpose of quantitatively eliciting older people's personal goals. However, when the pilot questionnaire was tested, it became clear that using a quantitative method to elicit personal goals is not a good approach, as it yields rather limited variation and individuality in the content of personal goals. Thus, it is recommended that when studying goal content, an open-ended method will result in more informative and reliable outcomes. In previous studies, goal modification has been assessed with scales measuring the general tendency to either tenaciously strive for goals or more flexibly adjust and disengage from goals (e.g., Brandtstädter & Renner 1990; Haase et al 2013; Wrosch et al. 2002). The premises of, for example, the SOC -model have been empirically tested by the SOC -questionnaire (Freund & Baltes 1998; Baltes et al. 1999a), and those of the dual-process model of developmental regulation by the tenacious goal pursuit and flexible goal adjustment scales (Brandtstädter & Renner 1990). These scales do not provide information on, for example, what kinds of personal goals older people select, and which goals they possibly disengage from with aging. This study was able to answer to these questions by using the open-ended question on personal goals of the PPA.

However, it should be noted that an open-method solution of this kind is not unproblematic. In the context of this study, it is possible that the participants might have had some additional personal goals, which they did not come to think of at the moment of the measurements. Also, for some of the participants, it was hard to understand what is meant by the term personal goals. In some cases this may have resulted in short statements on having no personal goals, or abstaining from answering to the question at all. In the second data wave of the FITSA study, the PPA was conducted as a structured interview as part of a larger study protocol in a research laboratory, and in the third wave via a postal questionnaire. This difference in the data collection

method may have affected the answers of the participants. Further, a large number of participants did not answer the goal question in the postal questionnaire, possibly because it was the last question in a long questionnaire, or because the question was hard to understand, as there was no interviewer present to explain it in more detail.

When eliciting personal goal content with an open-ended question, but conducting the further analysis with statistical methods, the content needs to be categorized with a content analytic approach, typically by utilizing a coding scheme (Little 1983). This inevitably raises a number of issues to be resolved. First, the coding scheme should be designed to meet the purpose of the study at hand (Little 1983). In this study, the focus was on the different areas of life in which older people may have goals. The coding scheme of the FITSA study was developed by Salmela-Aro et al. (2009), and for the LISPE study, this coding scheme was further developed by the author. One of the aim was to better distinguish between the different types of health-related goals of older people, by a dual focus on goals reflecting an approach (i.e., improvement) and goals reflecting an avoidance (i.e., maintenance) motivation. The results indicated that health maintenance goals were typical among older people with good health resources, while those with poor health resources reported more recovery goals. Thus, it can be concluded that making this distinction was relevant. In developing the coding scheme, an attempt to differentiate between leisure-time activities outside the home and inside the home was made. However, it was found that, for example, life-space mobility was actually higher among those with goals related to hobbies pursued at home than among those with goals related to hobbies pursued outside the home. Therefore the attempted distinction between different leisure-time activity goals was not a fruitful one, at least not in relation to health outcomes.

Since the participants reported their goals in their own words, it was sometimes difficult to determine what the main content of the goal statement was, and in which goal category it should be placed. Also, one statement quite often included two or more different goals. When sorting the data, these utterances were divided into separate goal statements. In the FITSA study, the personal goals reported by the participants in the two different data waves were classified by different raters, which may have caused some differences in the assignment of content to a goal category. Also, sometimes it was difficult to assign a goal into just one category, as it could equally have fitted two different categories. However, the personal goal data were classified by two independent raters at each measurement, and the percentage rate of agreement between the raters was good in both the FITSA (91% at W2 as reported by Salmela-Aro et al. 2009, and 84% at W3) and LISPE (89%) studies. In the LISPE data, most of the disagreements between the raters were related to distinguishing the categories of "maintaining functioning" and "improving functioning". Yet, as these goals were observed to be reported by people with different health resources, the classification can be deemed successful. Also the category of "activeness in daily life" was problematic, as it was somewhat similar to the categories of

"exercise" and "hobbies at home". The reliability of the categorizations was improved by discussion between the raters of all such differences until total agreement was achieved. It can nevertheless be concluded that the further development of coding schemes for classifying personal goal content among older populations is needed.

Due to the large study protocols of both the LISPE and FITSA studies, it was not possible to conduct the Personal Project Analysis in its entirety among the elderly participants. To date, the PPA has not been fully applied in studies among older people. However, including other parts of the PPA in a future study protocol would greatly add to the scientific knowledge on older people's personal goals. For example, the associations between personal goal setting and health-related outcomes would be better understood if the appraisals attached to each of the personal goals were also known (the Appraisal Matrix). Furthermore, the relations of different personal goals in a persons' life could be more closely explored with using the Cross-Impact Matrix and the Hierarchy model of the PPA.

The participants of both LISPE and FITSA studies represented a somewhat healthier proportion of their age group, and hence the associations found in this study could be underestimates. Further, knowledge on the personal goals of older people with more serious health problems was not obtained in this study, which limits the generalization of the results on goal content to the whole of the aging population. The FITSA study included only female twins. Twins do not differ from other members of the population, but they may benefit from having support from a twin sibling throughout their lives. The fact that the FITSA participants were twins was taken into account in the statistical analysis. The participants of the LISPE study were a random sample drawn from a national register, and represented both sexes and a wide age range of community-dwelling older people, which adds to the generalizability of this study.

Due to the cross-sectional nature of Study I and parts of Study III, some of the conclusions drawn on the basis of the results are speculative. Further, it should be noted that the follow-up time of eight years in the FITSA study was rather long in light of the target population of older people. The results of the changes in personal goal content and the relationship between these changes and mobility limitation need to be interpreted with caution, since it cannot be confirmed whether goal disengagement was preceded by mobility difficulties or vice versa. Further, only a small number of participants were included in the longitudinal analysis of Study II, which did not allow adjustments for potential confounders.

The measures of mobility limitation and exercise activity were self-reported from a few multiple choice alternatives. Thus, all the individual differences in the respective measures may not have been captured. Also, self-reported measures often induce answers in the middle of the scale. This may have caused underestimation of the associations found in this study. Further, the response options in these measures are open to interpretation. For example, the participants may have had different ideas about what constitute minor or

major difficulties in walking, or what counts as, e.g., quite a lot of leisure-time exercise. Consequently, people with similar mobility or exercise activity levels may have been assigned to different categories. However, the strength of these self-reported measures is that they describe mobility and exercise activity as experienced by the participants in their daily life surroundings. Moreover, the mobility measures employed in this study are widely used in health scientific research and thus established methods for assessing mobility.

6.4 Implications and future directions

Public discussions and policy strategies have centered on the negative consequences of population aging, the "demographic time bomb", including exploding economies and catastrophes in social and health care. The main objective of aging policies seems to be on finding ways to enable older people to manage at home for as long as possible – or just simply survive. Little thought has been given to how older people, even those with poor health and functioning, could live meaningfully and with continued participation in society. With its focus on older people's personal goals and the relations of these goals to activity participation, this study adds a new viewpoint to the discourses on aging. The finding that older people have many kinds of personal goals in their lives shows that old age needs not to be solely about surviving – it can be about living, in the fullest sense.

There has been a large void in studies on personal goal content among older people, and consequently the few that have been conducted are partially outdated. By exploring personal goals in a total sample of 1132 older women and men, this study adds significantly to the literature on older people's personal goal content. Although included in the social ecological theory of human personality (Little 2007, 2014), the associations between personal goal content and activity participation have not been studied before among older people. This study explored several associations derived from this model, and thus supported its usefulness in studying personal goals in a multidisciplinary context. This is among the first studies to examine personal goals and developmental regulation within a framework of health and functioning. It shows that studying developmental regulation contributes also to other disciplines than psychology. For gerontology, the focus on older people as agents opens up a whole new field of possibilities.

The associations found in this study between life resources and goal setting, and between mobility limitation and goal disengagement, provide empirical evidence to support the premises of the SOC -model (Baltes & Baltes 1990), the dual-process model of developmental regulation (Brandtstädter 2009; Brandtstädter & Renner 1990), and the motivational theory of lifespan development (Heckhausen et al. 2010). In addition, based on the results on the relationship between personal goal content and exercise activity / life-space mobility, the adaptive value of goal engagement as a factor in increasing the

likelihood of active aging was emphasized. Since the relevance of goal adjustment in the face of functional decline was also acknowledged, future studies need to address the issue of when is the time to let go of unachievable goals, and when it would be better to continue striving for the desired outcomes. While the benefits of goal adjustment for psychological well-being in the face of health problems are well documented (e.g., Boerner 2004; Dunne et al. 2011; Garnefski et al. 2009), the unanswered question is, what are the consequences for physical well-being if, for example, activity-related goals are abandoned when functioning starts to decline? Some preliminary research has been published on the physical health benefits of maintaining tenaciousness in goal pursuit (Hamm et al. 2014; Kelly et al. 2013). Future studies are needed to examine the relationships of goal engagement and goal adjustment to both psychological and physical well-being in old age.

Uncertainty exists as to why so many older people remain sedentary, despite wide general awareness of the benefits of physical activity and exercise (Mechling & Netz 2009). This study provided a new viewpoint on older people's exercise activity: the distinction between facilitative and competitive personal goals. Further studies are needed to explore the relationships between different personal goals, and how these goals, and combinations of goals, relate to older people's activity levels. It has been recommended that interventions aimed at promoting older adults' physical activity or exercise engagement include a behavioral component (Cress et al., 2006). Therefore, efforts should be targeted at encouraging people to set individual exercise-related personal goals that are realistic both for the person and his/her life situation (Davis & White 2008) as well as with the other personal goals a person has in his/her life at that moment (Gebhardt 2008; Karoly et al. 2005; Riediger & Freund 2004). It should also be noted that physical activity levels can also be increased through goals other than exercise-related ones. Striving for meaningful personal goals generally involves people leaving their homes for the purpose of, e.g., participating in activities, meeting friends, or just walking around the neighborhood or in the nearby natural environment. This alone will most likely result in increased physical activity and in the corresponding health benefits.

One of the main results of this study indicated that functional decline may lead to goal disengagement, especially from goals related to exercise. Unmet physical activity need is common among older people with health and mobility decline (Rantakokko et al. 2010). Thus, a key policy would be to support older people in modifying their exercise goals as the need arises so that they are still able to engage in at least some kind of physical activity. People could also be supported in targeting their efforts towards the attainment of specific physical activity goals (i.e., to use optimization). Further, it would be important to consider the compensatory methods older people could apply in pursuing their goals in the face of functional decline (Baltes 1997; Freund & Baltes 1998). Concerning physical activities, for example volunteer help for taking walks or participation in group activities could be employed. It has been reported that older people might be able to continue participating in their chosen activities

even with functional decline, if they have other, e.g., social, resources (Morrow-Howell et al. 2014). Further, as merely leaving the home can increase physical activity among older people (Tsai et al. 2015), encouraging people to set meaningful personal goals that require leaving the home would be important. This could also help older people to maintain their life-space mobility, and thus slow down the disablement process and increase quality of life in old age (Rantakokko et al. 2015b).

This study has laid a foundation for a new research area in gerontology. Therefore, more studies exploring the relations between older people's personal goals and health-related outcomes are warranted. It would be important, using a longitudinal design, to examine how the presence of goals in different areas of life predicts future health and functioning, and whether goal engagement could, e.g., postpone institutionalization and mortality. In this study, it was noticed that goal setting is dependent on different resources in life and that goal setting may promote active aging. Clearly, further longitudinal studies are needed to more closely examine the predictors of active aging and the role of personal goals in the pathway from life resources to active aging. How older people's personal goals actually relate to their behavior and the decisions they make in their everyday life should also be studied. Furthermore, as the participants of this study were rather well-functioning, future studies should also explore the goals of disabled or otherwise fragile older people.

Throughout their lives, people should be able to fulfill themselves as persons – including older people with poor health or living in long-term care (Pirhonen & Pietilä 2015). This may be attainable when people are able to strive for meaningful personal goals in their lives. The goals of older people are often small and concrete, but possibly highly relevant for their quality of life. Therefore, it would be important to listen to what older people, even those in the weakest condition, wish from their lives and hope to still strive for. However, some older people do not have any personal goals. It would, therefore, be important to encourage these people to think about their hopes and wishes for each day and for the future. This is especially important for older people in a more disadvantageous situation, for example, for those living alone or with declining health and functioning. Therefore, public awareness on the importance of goal setting throughout the lifespan should be increased. The topic of goal engagement could also be embedded in relevant meetings and groups, where older people could ponder on their goals and hopes for the future, and the ways that these goals could be reached. Previously, an intervention focusing on setting, planning, pursuing, and realizing meaningful personal goals was found to increase well-being among aging people (Lapierre et al. 2007). Further, the importance of active goal striving for the maintenance of exercise activity and life-space mobility should be recognized, and older people encouraged to strive for activeness in ways that are both possible and meaningful for them. This could help many people to live a meaningful and active old age.

7 MAIN FINDINGS AND CONCLUSIONS

The main findings and conclusions of the present study can be summarized as follows:

1. Health-related goals are emphasized in old age. In addition, older people have a rich variety of personal goals in their lives, most commonly related to leisure-time activities and social relations.

2. Activity-related and social goals are more common among participants with good health resources.

3. Goals related to exercise and cultural activities are often abandoned with increasing age, at least partly due to mobility decline.

4. Activity-related goals may increase older people's exercise activity. Prioritizing goals related to health and independent living may interfere with strivings toward physical and leisure-time activities.

5. Older people with goals related to mental and physical activity have higher life-space mobility. Striving toward maintaining functioning may help older people to maintain higher life-space mobility and thus slow down the disablement process.

YHTEENVETO (FINNISH SUMMARY)

Henkilökohtaiset tavoitteet vanhuudessa ja niiden yhteydet elämän voimavaroihin, liikunta-aktiivisuuteen ja elinpiiriliikkuvuuteen.

Aktiivisen ikääntymisen kannalta on tärkeää, että ihmiset voivat liikkua ja osallistua erilaisiin aktiviteetteihin omien tavoitteidensa mukaisesti. Elämänkulun aikana ihmiset asettavat itselleen monenlaisia henkilökohtaisia tavoitteita, joita he pyrkivät saavuttamaan, mutta myös muokkaavat niitä tarvittaessa ja luopuvat tavoitteista, joiden saavuttaminen osoittautuu liian vaikeaksi. Mahdollisuudet asettaa elämäntavoitteita ovat riippuvaisia niistä voimavaroista, joita ihmisellä on käytössään. Vanhuutta kuvataan usein elämänvaiheena, johon liittyy paljon erilaisia menetyksiä, siis voimavarojen vähentymistä. Selkeimmin nämä menetykset näkyvät terveyden ja toimintakyvyn heikkenemisessä. Onkin oletettavaa, että voimavarat elämän eri osa-alueilla vaikuttavat siihen, minkälaisia tavoitteita iäkkäät ihmiset itselleen asettavat. Erilaiset ikään liittyvät menetykset voivat myös johtaa joistain tavoitteista luopumiseen. Lisäksi voidaan olettaa, että ihmisen omat pyrkimykset toteuttaa tavoitteitaan vaikuttavat myönteisesti hänen aktiivisuuteensa ja osallistumiseensa yhteiskunnassa. Henkilökohtaiset tavoitteet voivat kannustaa ihmisiä jatkamaan itselle tärkeiden asioiden harrastamista läpi elämänkulun. On myös mahdollista, että tavoitteiden asettaminen ja niiden mukaisesti toimiminen voisi hidastaa toimintakyvyn heikkenemistä ja näin edistää aktiivisen vanhenemisen toteutumista.

Tämän tutkimuksen tarkoituksena oli selvittää, minkälaisia henkilökohtaisia tavoitteita iäkkäillä ihmisillä on, miten nämä tavoitteet muuttuvat iän lisääntyessä, miten elämän voimavarat ovat yhteydessä tavoitteiden sisältöihin ja miten liikkumiskyvyn heikkeneminen mahdollisesti vaikuttaa tavoitteiden muuttumiseen iän myötä. Lisäksi tutkimuksessa tarkasteltiin tavoitteiden sisällön yhteyttä liikunta-aktiivisuuteen ja elinpiirin muutoksiin vanhuudessa. Tutkimukseen käytettiin aineistoa kahdesta eri tutkimusprojektista. Life-Space Mobility in Old Age (LISPE) -projektista tähän tutkimukseen osallistui 824 itsenäisesti kotonaan asuvaa miestä ja naista Jyväskylän ja Muuramen alueilta. Iältään he olivat 75–90 -vuotiaita. The Finnish Twin Study on Aging (FITSA) -projektista mukana oli 308 iältään 66–79 -vuotiasta naista eri puolilta Suomea.

Tähän tutkimukseen osallistuneiden iäkkäiden henkilöiden tavoitteet liittyivät yleisimmin terveyteen ja toimintakykyyn, erityisesti niiden ylläpitämiseen. Myös sosiaalisiin suhteisiin, vapaa-ajan harrastuksiin sekä fyysiseen aktiivisuuteen ja liikuntaan liittyvät tavoitteet olivat yleisiä. Vain pieni osa tutkittavista sanoi, ettei heillä ollut tavoitteita lainkaan. Terveyteen liittyvät voimavarat, erityisesti hyvä kävelykyky, olivat yhteydessä sosiaalisiin sekä vapaa-ajan harrastuksiin ja fyysiseen aktiivisuuteen liittyviin tavoitteisiin. Myös terveyden ylläpitämiseen liittyvät tavoitteet korostuivat niillä, joilla terveystilanne oli hyvä, kun taas toipumiseen liittyviä tavoitteita oli useammin niillä, joilla oli terveysongelmia. Kahdeksan vuoden seurantajaksolla liikuntaan ja kulttuuri-harrastuksiin liittyvien tavoitteiden määrä väheni huomattavasti.

Ne tutkittavat, joille oli vuosien myötä ilmaantunut kävelyvaikeuksia, todennäköisemmin olivat luopuneet kulttuuriharrastuksiin liittyvistä tavoitteistaan seurannan aikana. Vastaavasti yksikään tutkittava, jolle oli ilmaantunut kävelyvaikeuksia, ei asettanut enää itselleen uusia liikuntaan liittyviä tavoitteita.

Tutkimuksen tulokset osoittivat myös, että liikuntaan liittyvät tavoitteet olivat yhteydessä korkeampaan liikunta-aktiivisuuteen ja sen säilymiseen korkeampana kahdeksanvuotisessa seurannassa. Henkilöt, joilla oli terveyteen tai itsenäiseen elämään liittyviä tavoitteita, eivät juuri asettaneet itselleen liikuntatavoitteita. Aktiiviseen elämäntyyliin liittyvät tavoitteet sen sijaan tukivat liikuntatavoitteiden toteuttamista. Aktiiviset elämäntavoitteet olivat myös yhteydessä laajempaan elinpiiriin. Lisäksi pyrkimys toimintakyvyn ylläpitämiseen ennusti elinpiirin säilymistä laajempana kahden vuoden seurannan aikana.

Tämän tutkimuksen tulokset tukevat oletusta siitä, että elämän voimavarat vaikuttavat tavoitteiden asettamiseen vanhuudessa. Tulosten perusteella vaikuttaa siltä, että erityisesti heikko terveys ja toimintakyky voivat estää monien aktiiviseen elämäntyyliin liittyvien tavoitteiden asettamista. Vaikuttaa kuitenkin siltä, että nimenomaan aktiiviset elämäntavoitteet voisivat edistää terveyttä ja toimintakykyä vanhuudessa lisäämällä liikunta-aktiivisuutta ja elinpiirin laajuutta. Olisikin tärkeää, että erityisesti toimintakyvyn ongelmista kärsiviä iäkkäitä ihmisiä kannustettaisiin asettamaan itselleen merkityksellisiä ja omaan terveys- ja elämäntilanteeseen sopivia tavoitteita. Olisi myös tärkeää kehittää keinoja, joilla näitä henkilöitä voitaisiin tukea omiin tavoitteisiinsa pyrkimisessä. Näin voitaisiin edistää mielekkään ja aktiivisen vanhuuden toteutumista mahdollisimman monen iäkkään henkilön elämässä.

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ORIGINAL PUBLICATIONS

I

RESOURCES IN LIFE AND PERSONAL GOALS IN OLD AGE

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OLDER WOMEN'S PERSONAL GOALS AND EXERCISE ACTIVITY: AN EIGHT-YEAR FOLLOW-UP

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IV

PERSONAL GOALS AND CHANGES IN LIFE-SPACE MOBILITY AMONG OLDER PEOPLE

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Personal goals and changes in life-space mobility among older people☆

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ABSTRACT

Objective. Life-space mobility – the spatial extent of mobility in daily life – is associated with quality of life and physical functioning but may also be influenced by future orientation expressed in personal goals. The aim of this study was to explore how different personal goals predict changes in older people's life-space mobility.

Methods. This prospective cohort study with a 2-year follow-up included 824 community-dwelling people aged 75 to 90 years from the municipalities of Jyväskylä and Muurame in Central Finland. As part of the Life-Space Mobility in Old Age study (LISPE), which was conducted between 2012 and 2014, the participants responded to the Life-Space Assessment and Personal Project Analysis in addition to questions on socio-demographics and health. Data were analyzed using generalized estimation equation models.

Results. The results showed that goals indicating a desire to be active in daily life, to stay mentally alert, and to exercise were associated with higher life-space mobility, and that the associations remained over the follow-up years. Goals related to maintaining functioning predicted higher life-space mobility at the 2-year follow-up. In contrast, goals reflecting improvement of poor physical functioning predicted lower life-space mobility. The results remained significant even when adjusted for indicators of health and functioning.

Conclusions. This study indicates that supporting older people in striving for relevant personal goals in their lives might contribute to a larger life-space and thus also to improved quality of life in old age.

Introduction

Going outside one's home and moving in and outside of the neighborhood is an important element in living a meaningful life in old age, as it enables the use of community amenities and participation in social activities (Satariano et al., 2012). Restrictions in life-space mobility, a measure reflecting everyday movement in different life-space areas (bedroom, home, outside home, neighborhood, town, outside town; Baker et al., 2003), is common in old age (Allman et al., 2006; Barnes et al., 2007). Besides higher age, functional limitations have consistently been correlated with lower life-space mobility. Also, female sex, lower education and income, depressive symptoms, cognitive decline, and transportation problems are associated with life-space restriction (Al Snih et al., 2012; Barnes et al., 2007; Peel et al., 2005; Sartori et al., 2012). Higher life-space mobility has been associated with sense of autonomy (Portegijs et al., 2014a), extraverted personality, social activity, and orienting more toward the future instead of only the present day (Barnes et al., 2007). Higher life-space mobility correlates with better quality of life (Rantakokko et al., 2013, under review) and may even decrease the risk of frailty and mortality (Xue et al., 2008). Consequently, finding ways to maintain or increase life-space mobility could contribute to well-being in old age.

People often act according to their personal goals (Deci and Ryan, 2000), which are highly individualized states that people strive to achieve or avoid in the future (Freund and Riediger, 2006). In old age, personal goals most often relate to health, close relationships, and leisure time activities (Lawton et al., 2002; Saajanaho et al., 2014a). Previous research has indicated that older people's goals are affected by their health and functional limitations (Lawton et al., 2002; Saajanaho et al., 2014a). Previously, goal engagement in old age has been associated with more activity participation (Holahan, 1988) and better psychological well-being (Lawton et al., 2002). Also, having relevant personal goals may help older people maintain higher exercise activity (Saajanaho et al., 2014b). Goal engagement may be a resource for facing age-related health deterioration (Haase et al., 2013) and thus potentially prevent people from drifting into a vicious circle resulting in decreased life-space mobility and eventually home confinement—a situation that in practice renders active aging impossible.

Life-space mobility is affected by multiple factors, and not by physical functioning alone (Allman et al., 2006). Previous studies have not explored how goal engagement is reflected in life-space mobility,

Abbreviations: LISPE, Life-Space Mobility in Old Age; LSMC score, life-space mobility composite score; GEE model, generalized estimating equations model.

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although it seems reasonable to assume that some goals require moving in a larger life-space than others. Personal goals can function as a pathway to maintaining valued behaviors throughout the life course (Baltes, 1997). It can be argued that not striving for personal goals could constitute a risk factor for life-space restriction, whereas engagement in relevant personal goals could contribute to maintaining and achieving higher life-space mobility. The purpose of this study was to explore how the content of older people's personal goals affects life-space mobility over a 2-year follow-up.

Methods

Participants

The present data came from the Life-Space Mobility in Old Age study (LISPE), which was a 2-year prospective cohort study of community-dwelling older people aged 75 to 90 years conducted in the municipalities of Jyväskylä and Muurame in Central Finland. Details of the recruitment procedure and the study flow of LISPE have been described in detail elsewhere (Rantanen et al., 2012). A random sample of 2550 people was drawn from the national population register. These individuals were contacted to ascertain their interest in taking part in the study. To be included, the participants had to be living independently in their own homes, not have any severe problems in communication, and be willing to participate in the study. Finally, 848 people (62% female) participated in a structured home interview implemented between January and June in 2012. The first follow-up was conducted one year, and the second follow-up two years after the baseline assessment. The first follow-up was conducted via telephone interviews and the second follow-up via telephone interviews and postal questionnaires. During the two follow-up years, 41 participants died and 15 were admitted to institutional care. Other reasons for attrition were inability to communicate (12), moving outside the study area (6), poor health (5), not willing (6), and not reached (2). The present analyses utilize data on 824 older people who had answered the question on personal goals at baseline. Of these, 795 participated in the 1-year and 742 in the 2-year follow-up.

This study was approved by the ethical committee of the University of Jyväskylä, Finland, and the participants gave their written informed consent. Good scientific practice was followed throughout the study in accordance with the principles laid down by the Declaration of Helsinki.

Measurements

Life-space mobility

Life-space mobility was measured using the University of Alabama at Birmingham Study of Aging Life-Space Assessment Baker et al. (2003) in face-to-face interviews at baseline and in telephone interviews at the first and second follow-ups. The Life-Space Assessment was translated into Finnish (Rantanen et al., 2012). A test–retest study found the measurement to be fairly reliable and responsive to change in the Finnish context regardless of season (Portegijs et al., 2014b). The assessment includes six nested life-space tiers starting from the bedroom and expanding to include home, yard, neighborhood, town, and beyond town. The participants were asked how often they moved in these different life-space tiers and whether they needed help from any devices or another person to do so. For the analysis, we used the life-space mobility composite score (LSMC score), which reflects the distance, frequency, and level of independence of mobility. The score ranges from 0 to 120 with higher scores indicating higher life-space mobility.

Personal goals

The content of personal goals was asked with a revised version of Brian R. Little's (1983) Personal Project Analysis. The following instruction was used in the interview: "We all have different personal goals that we strive to realize in our daily lives or reach in the future. The goals may be related to any life domain, such as hobbies, daily life, health, family, or friends. Think about the goals you have at the moment. The goals can be big or small; the main thing is that they are important for you." The participants reported between zero and seven personal goals. A coding scheme with 25 goal categories was designed for the purpose of classifying goal content, utilizing the coding scheme developed by Salmela-Aro et al. (2009). The goals were classified independently by two trained assessors, and the percentage rate of agreement between the assessors was 89%. Discrepancies between the assessors were discussed until total agreement was achieved. Each of the 25 personal goal categories was coded on a dichotomous scale, 1 indicating having at least one goal in the category, and 0 no goals in the category. A person could have goals in several different categories or several goals in one category. We added a separate category of "no goals," in which 1 indicated having no goals and 0 at least one goal in any of the 25 goal categories. The goal categories and examples of their content are presented in Table 1.

Covariates

Participants' date of birth was derived from the national population register, while the data for all the other covariates were collected during home interview. The other covariates were years of education, perceived economic situation (good or very good vs. moderate, poor, very poor) and perceived difficulties in walking 2 km (no difficulties, minor difficulties and major difficulties/unable). Number of chronic diseases was calculated based on physician-diagnosed conditions, self-reported from a list of 22 chronic conditions, including e.g., coronary artery disease, arthritis, diabetes, cancer, Parkinson's disease, Alzheimer's disease or other dementia, depression, visual impairment, and hearing loss. Diagnoses not included in the list were prompted with an additional open question (Portegijs et al., 2014a).

Statistical analysis

The descriptive characteristics of the participants are reported as mean values and standard deviations for continuous variables and percentage distributions for categorical variables. Independent-sample *t*-test and chi-square test were used to compare differences in the descriptive characteristics between those who did versus those who did not report at least one personal goal. The correlations between the study variables were computed using Spearman's rank correlation coefficient.

To study the changes in the LSMC score based on reporting vs. not reporting personal goals in each goal category, we conducted a generalized estimating equations (GEE) model (Liang and Zeger, 2006) by specifying an unstructured outcome covariance matrix. This feature is an advantage in comparison with models that are based on the assumption of compound symmetry (i.e., constant covariance) of the outcome covariance matrix (e.g., repeated-measures variance analysis). We estimated main effects of personal goals on life-space mobility and time interaction effects for the 1- and 2-year follow-ups. Due to the large number of goal categories, we only included in the analysis goal categories for which a significant difference ($p < .10$) was observed in the LSMC score at baseline or at either of the follow-ups. Also, categories in which fewer than 30 participants reported having goals were not analyzed further as lack of power prevented meaningful multivariate modeling. This resulted in 11 goal categories for inclusion in the GEE model. As the correlations between the goal categories were low (range from −.131 to .194), indicating no substantial collinearity, we were able to include all of them in the same model as individual dummy predictor variables. We conducted an age and sex-adjusted model, and a model which was further adjusted for years of education, perceived economic situation, number of chronic conditions, and perceived difficulties in walking 2 km (fully adjusted). There were no substantial differences between the models, and thus we report only the results of the fully adjusted model. A separate GEE model with similar adjustments, in which at least one goal reported was as a predictor variable, was used to study changes in the LSMC score. The level of statistical significance was set at $p < .05$. The analyses were conducted using SPSS 20.0 for Windows (IBM SPSS Inc.).

Results

Descriptive results

The average age of the participants was 80.6 ± 4.2, 62% of them were women, and 41% reported having at least minor difficulties in walking 2 km. The average LSMC score was 64.3 ± 20.5 at baseline, 62.6 ± 22.0 at the first follow-up, and 61.7 ± 21.9 at the second follow-up. The participants reported between zero and seven personal goals. Those who did not report any goals were older, had somewhat less education, more often reported having difficulties in walking 2 km, and had a lower LSMC score compared to those reporting at least one personal goal (Table 2).

Table 1
The personal goal categories, examples of their content, number of participants reporting them, and average life-space mobility score at baseline by reporting vs. not reporting goals in each goal category ($n = 824$, LISPE study conducted in Central Finland in 2012–2014).

			Life-space mobility score		
			Goal		
Personal goal category	Example	% (n) reporting	Yes (mean ± SD)	No (mean ± SD)	p-value*
Maintaining health	"To stay healthy"	32 (263)	66 ± 19.8	64 ± 20.7	.165
Maintaining functioning	"To maintain functional ability"	20 (165)	68 ± 18.6	63 ± 20.8	.009
Activeness in daily life	"Going outside everyday"	16 (133)	69 ± 19.4	63 ± 20.5	.002
Travel/summer cottage	"To travel to some place warm"	15 (124)	68 ± 17.3	64 ± 20.9	.006
Family	"To visit children"	14 (119)	63 ± 21.1	64 ± 20.4	.580
Independent living	"To be able to take care of myself and my home"	15 (124)	62 ± 22.0	65 ± 20.2	.187
Hobbies at home	"To do handicrafts"	14 (111)	69 ± 19.3	63 ± 20.5	.004
Exercise	"To exercise more"	10 (85)	72 ± 17.2	63 ± 20.6	<.001
Meeting other people	"Spending time with friends"	13 (107)	69 ± 18.7	64 ± 20.7	.012
Life as it is	"That life would stay as it is"	9 (76)	64 ± 21.9	64 ± 20.2	.920
Healthy lifestyle	"Living healthy"	8 (68)	65 ± 19.2	64 ± 20.6	.792
Participation in social events	"To participate in war veterans' events"	6 (48)	69 ± 19.3	64 ± 20.5	.087
Helping others	"To support children in their lives"	6 (48)	69 ± 19.3	64 ± 20.5	.073
Other's health and well-being	"Good future for our grandchildren"	6 (45)	69 ± 19.2	64 ± 20.5	.131
Mental health	"To stay mentally alert"	5 (38)	75 ± 14.9	64 ± 20.6	<.001
Recovery/Managing illnesses	"That cancer treatment would work"	5 (38)	56 ± 20.8	65 ± 20.4	.008
Improving functioning	"To be able to walk normally, as before"	4 (34)	54 ± 21.9	65 ± 20.3	.004
Hobbies outside home	"Continue going to concerts"	4 (33)	66 ± 20.1	64 ± 20.5	.546
Economic issues	"To save money"	4 (32)	68 ± 26.5	64 ± 20.2	.239
Living arrangements	"To move to the city center"	4 (32)	64 ± 19.4	64 ± 20.5	.955
Character	"To be as good a person as possible"	2 (20)	64 ± 17.9	64 ± 20.5	.976
End-of-life issues	"I have lost all interest in life, I'm waiting for death"	2 (13)	54 ± 21.0	64 ± 20.4	.081
Common good	"To participate in the development of society"	2 (14)	66 ± 22.0	64 ± 20.5	.782
Philosophy of life/religion	"To live according to God's will"	2 (12)	56 ± 28.1	64 ± 20.3	.178
Other	"To have a dog"	1 (11)	65 ± 12.8	64 ± 20.6	.803
No goals	"I have no goals anymore"	6 (51)	56 ± 21.1	65 ± 20.3	.002

* Independent-sample t-test.

Personal goals related to maintaining health (32% had at least one goal in this category) and maintaining functioning (20%) were the most frequently reported by the participants. The LSMC score at baseline was significantly higher among those reporting goals related to maintaining functioning, activeness in daily life, exercise, hobbies at home, meeting other people, mental health, or travel/summer cottage when compared to those not reporting such goals. Those with goals related to recovery/managing illnesses or to improving functioning had significantly lower LSMC score compared to those not reporting such goals (Table 1).

The associations of personal goals with life-space mobility

The GEE model showed that those who did not report any personal goals had a somewhat lower LSMC score than those who reported at least one personal goal in any of the goal categories (marginal mean ± SD: 61 ± 2.6 vs. 65 ± 0.6; $p = .06$). This difference persisted throughout the two follow-up years (59 ± 2.6 vs. 63 ± 0.6 at the first follow-up and 57 ± 2.5 vs. 61 ± 0.6 at the second follow-up; group × time interaction effect $p = .994$; fully adjusted model).

The time effect on the fully adjusted GEE model with 11 goal categories as separate predictor variables was not significant ($p = 0.981$). Participants who reported goals related to maintaining functioning had a relatively stable LSMC score, whereas the scores of those with no such goals decreased over the years. Those with goals related to activeness in daily life, exercise, and mental health had a higher LSMC score at baseline compared to those with no such goals. The differences between the groups persisted over the 2-year follow-up for goals related to exercise and mental health, and over the 1-year follow-up for goals related to activeness in daily life. Those who reported goals related to improving functioning had a lower LSMC score at

Table 2
Descriptive characteristics of the total study population and by reporting vs. not reporting any personal goals ($n = 824$, LISPE study conducted in Central Finland in 2012–2014).

		Endorsing at least one personal goal		
	All	Yes ($n = 773$)	No ($n = 51$)	
	M (SD)	M (SD)	M (SD)	p-value*
Age in years	80.6 ± 4.2	80.4 ± 4.2	82.4 ± 4.1	.001
Years of education	9.6 ± 4.2	9.7 ± 4.2	8.6 ± 4.1	.066
Number of chronic conditions	4.4 ± 2.4	4.4 ± 2.5	4.2 ± 2.2	.711
Life-space mobility score	64.3 ± 20.5	64.8 ± 20.3	55.8 ± 21.1	.005
	%	%	%	
Women	62	63	57	.412
Good economic situation	51	51	51	.971
Difficulties in walking 2 km				.065
No difficulties	59	60	43	
Minor difficulties	20	20	29	
Major difficulties/unable	21	21	28	

Note: years of education $n = 817$; economic situation $n = 822$.
* Independent-sample t-test for continuous variables and chi-square test for categorized variables; significance level $p < .005$.

Table 3
Goal categories jointly predicting changes in life-space mobility score in a GEE model (LISPE study conducted in Central Finland in 2012-2014, 824 participants).

		Baseline		Follow-up 1		Follow-up 2		GEE model *p*-values	
		Mean	SE	Mean	SE	Mean	SE	Group	Group × time
Maintaining functioning	No	66	2.7	64	3.0	61	3.4	0.075	0.001
	Yes	67	3.0	65	3.3	66	3.5		
Activeness in daily life	No	65	2.8	63	3.1	63	3.4	0.048	0.443
	Yes	68	3.0	66	3.2	64	3.6		
Travel/summer cottage	No	67	2.7	64	3.0	64	3.3	0.886	0.515
	Yes	66	3.0	65	3.3	63	3.7		
Hobbies at home	No	66	2.7	65	3.0	63	3.5	0.671	0.312
	Yes	67	3.0	65	3.2	64	3.5		
Family	No	67	2.8	65	3.1	63	3.4	0.847	0.287
	Yes	66	3.0	65	3.2	65	3.6		
Meeting friends	No	64	2.7	65	2.9	63	3.3	0.185	0.054
	Yes	69	3.0	65	3.4	64	3.7		
Exercise	No	65	2.7	63	3.0	61	3.4	0.007	0.766
	Yes	68	3.1	67	3.3	66	3.6		
Helping others	No	66	2.5	64	2.8	63	3.0	0.435	0.775
	Yes	67	3.4	66	3.8	65	4.2		
Mental health	No	64	2.7	63	3. 0	62	3.1	0.030	0.762
	Yes	69	3.2	67	3.6	65	4.1		
Recovery/managing illnesses	No	69	2.5	67	2.7	65	3.2	0.076	0.680
	Yes	64	3.4	63	4.0	62	4.1		
Improving functioning	No	70	2.4	68	2.7	67	2.7	0.045	0.917
	Yes	64	3.8	62	4.2	60	4.9		

Note. GEE model; adjusted for age, sex, years of education, economic situation, number of chronic conditions and difficulties in walking 2 km; Mean = marginal mean, SE = standard error of marginal mean.

baseline than those with no such goals, and the difference between the groups remained over both follow-up years (Table 3).

Discussion

Personal goals indicating a desire to be active in daily life, to exercise, and to stay mentally alert were associated with higher life-space mobility and the associations persisted in the longitudinal analysis. At baseline, goals related to maintaining functioning were not associated with the LSMC score but were predictive of maintaining higher life-space mobility when compared to those not reporting such goals, among whom the LSMC score decreased over the following two years. In turn, goals reflecting the desire to improve physical functioning were associated with a lower LSMC score at the 2-year follow-up. Also, reporting at least one personal goal in any of the goal categories was associated with a higher LSMC score over the follow-up years. Since higher life-space mobility correlates with better quality of life (Rantakokko et al., 2013) and decreased risk for frailty and mortality (Xue et al., 2008), our results indicate that striving for both physical and mental activity may even increase well-being in old age.

Life-space mobility is strongly associated with functional ability (Peel et al., 2005; Portegijs et al., 2014a), but it also reflects interest in moving around and participating in social networks (Barnes et al., 2007). As goals may indicate an orientation toward the future, the current results are in line with those of a previous study indicating that older people who orient more to the future have larger life-space than those who focus mostly on the present day (Barnes et al., 2007). Endorsing goals in life may also signify willingness, and the ability, to plan the future, which has also been associated with larger life-space (Sartori et al., 2012). Several goal categories predicted higher life-space mobility, even when the analysis was adjusted for, e.g., health conditions and functional limitations. This strengthens the notion that in addition to physical functioning, psychosocial factors also contribute to life-space mobility. Similar finding was reported by Portegijs et al. (2014a) who concluded that alongside physical performance, sense of autonomy is also associated with life-space mobility.

The finding that reporting personal goals related to activeness in daily life and to exercise were associated with higher life-space mobility may be explained by the notion that those who endorse such goals are also more physically active (Saajanaho et al., 2014b), and thus in a better physical condition and able to move within a larger life-space. Personal goals are reflective of older people's health and functional abilities (Lawton et al., 2002; Saajanaho et al., 2014a). It is possible that the people with activity-related goals were initially healthier and thus able to better maintain their higher life-space mobility over the years. However, the associations between activity-related goals and life-space mobility were not attenuated even when the analysis was adjusted for indicators of health and functioning. Some of the goals related to activeness in daily life did not require travelling far from home (e.g., gardening) and as such do not explain the correlation with higher life-space mobility. However, these goals may reflect a tendency to be generally active in life, potentially manifested as higher life-space mobility. The same tendency may explain the result that goals related to mental health predicted higher life-space mobility. In our data, these goals often reflected strivings to stay mentally alert and thus may relate to higher activity participation, in turn reflected in higher life-space mobility. Also, goals related to maintaining functioning may indicate strivings to stay active and take care of one's health and functional ability. This was not reflected in life-space mobility immediately but did predict a higher LSMC score over time. The associations of different activity-related goals with life-space mobility suggest that although goal disengagement is common in old age (Saajanaho et al., 2014a), persistence in the pursuit of active life goals might be more beneficial for older people's physical well-being. Maintaining activity despite age-related functional decline may even decrease mortality risk (Hirvensalo et al., 2000).

Goals related to improving functioning were associated with lower life-space mobility, and the difference in the LSMC score between those who reported these goals versus those who did not, remained the same over the 2-year follow-up. In our data, these goals were often reported by people with poorer health and functioning, and thus typically indicated a desire to regain an earlier state of functional ability. As life-space mobility is strongly associated with physical functioning, it is understandable that these goals relate to lower life-space mobility. However, as goals related to improving functioning did not predict a higher LSMC score in the 2-year follow-up, they may stem from ruminating over one's own

situation instead of active striving toward improved functioning. As goals render life meaningful (Betzler, 2013), it would be important to encourage older people with functional problems to strive for, e.g., recreational goals in their lives. Such goals might motivate them to extend their life-space, which, in turn, might promote their functional ability.

This study is the first to examine the relations between personal goals and life-space mobility among older people. Moreover, by utilizing a longitudinal study design, we were able to demonstrate that some personal goals may predict changes in life-space mobility in old age. Due to the low correlation between the goal categories, we were able to include all of them in the same GEE model. This allowed us to identify which specific goals were the most significant predictors of changes in life-space mobility. Also, we were able to adjust our models for indicators of health and functioning, strengthening the assumption that goals may motivate older people to maintain a larger life-space irrespective of their physical condition. The participants represented both sexes and a wide age range of community-dwelling older people, which adds to the generalizability of the study.

There are also some limitations that need to be considered when interpreting the results of this study. The participants were somewhat healthier than average for their age. Moreover, people with severe communication problems, most likely due to cognitive impairment, were excluded from the study. The associations found might have been stronger had the participants shown more variation in physical and cognitive functioning. While we conclude that goals may be relevant for older people's life-space mobility, we also recognize that the ability to move around one's neighborhood and beyond and the level of independence one has in travelling contribute to older people's possibilities to set personal goals. In the personal project analysis, the participants reported their goals without using a structured questionnaire. Thus, the participants might have had additional goals that they did not report in the interview. We have no data on the participants' goals at the follow-up and thus cannot know if or how they changed, or how any such changes might have been reflected in life-space mobility longitudinally. Also, we cannot know to what degree the participants acted according to their personal goals.

Conclusion

Striving for personal goals may encourage older people to leave their home and move within a wider life-space. This may have important health benefits, as leaving the home is the single most important factor for increasing physical activity among older people (Tsai et al., 2015). In particular, goals related to being active, exercising, and maintaining functioning may benefit the quality of life of older people by enabling them to maintain a wider life-space (Rantakokko et al., 2013, under review). On the contrary, lack of interest in moving outside the home may result in some older people spending time mainly at home (Barnes et al., 2007), inevitably leading to sedentary behavior (Tsai et al., 2015). Consequently, supporting older people in striving for meaningful goals in their lives might contribute to a larger life-space and improved quality of life in old age.

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Conflict of interest statement

The authors declare that there are no conflicts of interest.

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