General introduction
1.1 AGEING POPULATIONS

While life expectancy is increasing worldwide, healthy life expectancy is not keeping pace, which contributes considerably to the burden of chronic diseases. The majority of elderly people will suffer from several chronic diseases: 40 percent of the Dutch elderly persons aged between 65-74 year are diagnosed with 2 or more chronic conditions, and almost 60 percent of the elderly persons aged 75 years and over are known to have multi-morbidity. Furthermore, with specialization and further sub-specialization the provided care has become increasingly fragmented, leading to coordination and communication challenges for healthcare professionals as well as for elderly individuals. In all, this has contributed to exponentially increasing healthcare demands and expenses. Moreover, due to the increasing governmental pressures to control costs and to eliminate waste and inefficiency, healthcare professionals are trying to identify elderly persons at risk for poor outcomes to allocate geriatric care more efficiently. The selection of high-risk older adults based on only chronological age disregards the fact that the speed of ageing shows considerable inter-individual variation. Selection on morbidity is also not recommended as elderly persons differ in terms of severity of illness, functional status, prognosis and risk of adverse events even if they are diagnosed with the same disease or pattern of conditions.

Therefore, other concepts like frailty and case complexity have been introduced in primary and geriatric care as indicators of risk of poor outcomes (e.g. mortality, institutionalization, hospitalization, and functional decline). Frail elderly people endure interacting losses in physical, cognitive, social, and psychological domains of functions, which leads to downward spiraling and declining reserve capacity for dealing with stressors. Case complex elderly persons highlight the need to foster better coordinated and integrated healthcare. To have clinical impact in daily practice, those concepts should be operationalized and assessed with measures with good psychometric properties since the corresponding scores may assist healthcare professionals in their clinical decision making. Based on the scores on the GFI and the IM-E-SA elderly persons can be selected for general care programs, or – in contrast – tailored elderly care, to prevent poor outcomes. Tailored care is expected to result in better health outcomes, lower costs, enhanced care experience and better quality of life. Subsequently, care interventions should be provided to prevent, maintain or even decrease levels of frailty or case complexity. Preferably, those measures should be completed by the elderly themselves as this reflects their own perspective on needs, preferences and health goals. The outcomes of self-report measures provide input for tailored elderly care, expectantly associated with better health outcomes, lower costs, an enhanced care experience, and better quality of life.
1.2 FRAILTY

Frailty reflects a state of vulnerability regarding the future occurrence of poor outcomes. This definition of frailty has been commonly accepted, though measures with different perspectives on the concept of frailty have been developed\textsuperscript{16,17}. Due to this difference in perspective, a systematic review found that the prevalence of frailty ranged between 4-59\% in community dwelling elderly populations\textsuperscript{17}. Some researchers define frailty with only a physical domain, this deficit model consists of an accumulation of impairments and conditions to create a Frailty Index\textsuperscript{18,19}. Another measure of frailty defined a phenotype which marked an underlying physiologic state of multisystem and energy dysregulation \textsuperscript{18,19}. Still others advocate an integrative and comprehensive approach which would include biological, cognitive, psychological, and social domains, which interact across an individual's lifespan\textsuperscript{20}.

The Groningen Frailty Indicator (GFI) is an instrument that measures frailty from a multidimensional perspective which is available as a professional version and a self-assessment version. Both versions are widely used in clinical practice (i.e. emergency departments, geriatric centers, nursing homes, pulmonology, rheumatology, and surgical medicine, traumatology), outpatient settings and in clinical studies\textsuperscript{6,7,21-24}. The scoring method of the GFI may aid capturing the dynamic state of frailty when calculating its total score on multiple time points. Moreover, also a dichotomous score can be calculated to differentiate between non-frail and frail elderly persons, and provide different care pathways accordingly\textsuperscript{21}. Frail elderly persons should be identified as early as possible since frailty is potentially reversible when care interventions are provided adequately\textsuperscript{25,26}.

Some evidence on the internal consistency and construct validity of the self-assessment version has been reported\textsuperscript{7,21,24}, yet this would need to be elaborated and expanded.
1.3 CASE COMPLEXITY

An alternative approach to identify elderly persons at risk for adverse health outcomes is to assess the level of case complexity with the INTERMED (IM). This is a semi-structured interview performed by a healthcare professional to identify those patients with complex care needs, and select those who are in need for more intensive (tailored) interdisciplinary care\textsuperscript{13-15,27}. Due to the presence of multi-morbidity, elderly persons are generally treated by several healthcare professionals. To prevent ad hoc allocation of care by those healthcare professionals, the IM method can be recommended as this method assesses healthcare needs in the following domains; biological, psychological, social and healthcare\textsuperscript{14,28}. For the use in elderly populations the IM has been adjusted to the needs and situation of the elderly themselves; the IM for the Elderly [IM-E]\textsuperscript{29}. Subsequently, a version to be completed by the elderly themselves (IM for the Elderly Self Assessment [IM-E-SA]) was developed. The latter version was developed to be more time-efficient for professionals and, moreover, to reflect the opinion of the elderly persons themselves about the care received. Both the IM and IM-E are reliable and valid measures for classifying individuals' care needs\textsuperscript{29-31}. The IM-E-SA facilitates the development of future demand driven care, however, the psychometric properties of this measure have not been reported.
1.4 AIMS AND SCOPE

The self-assessment versions of the GFI and IM-E reflect the perspectives of elderly individuals. Due to the limited psychometric evaluations of those measures, a reasonable doubt exists about their feasibility, reliability, construct validity and predictive validity. The overall aim of this PhD-thesis is to evaluate those psychometric properties in several cross sectional and longitudinal studies in order to evaluate and establish the potential contribution of the GFI and IM-E-SA towards tailored elderly care.

Within the Dutch National Care for the Elderly Programme a cross sectional study was conducted to evaluate the feasibility, reliability and construct validity of the GFI (Chapter 2) and IM-E-SA (Chapter 5).

Chapter 3 extensively assesses the construct validity of the GFI with data of almost 6,000 elderly persons participating in the LifeLines cohort study. This chapter evaluates the ability of the GFI to differentiate between elderly subgroups based on demographic characteristics, morbidity, obesity and healthcare utilization. Additional aims were if non-frail and frail elderly persons differ on a battery of measures (e.g. psychosocial problems, quality of life, and wellbeing) and, to examine which individual characteristics were associated with frailty.

Chapter 4 assesses the predictive validity of the GFI in an oldest old population participating in the Leiden 85+ study. This chapter evaluates an innovative approach to model development and risk assessment using individual characteristics (i.e. gender and morbidity) and the Groningen Frailty Indicator on the prediction of mortality, hospitalization and functional decline.

Chapter 6 evaluates the predictive validity of the GFI and IM-E-SA on total healthcare costs, costs for long-term care and curative care in the follow-up year.

Chapter 7 discusses the main results and methodological considerations of the psychometric evaluations. Next, the implementations of the GFI and IM-E-SA in several screenings methods are discussed. The final paragraph presents some recommendations for future research and ends with a final remark.

Chapter 8 provides a summary of this thesis in English and Dutch, respectively.
1.5 REFERENCES


