

Caught somewhere in time

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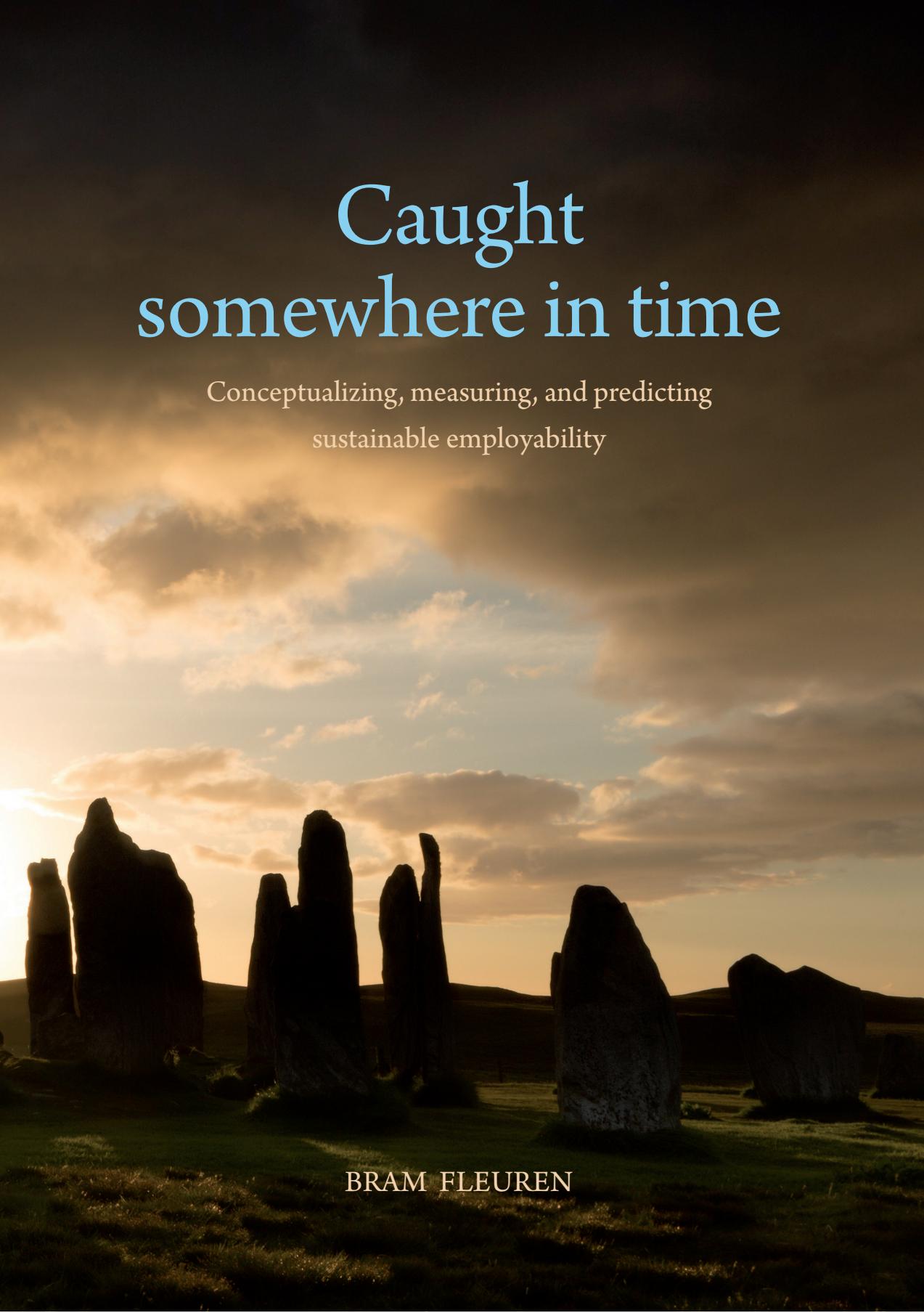
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Conceptualizing, measuring, and predicting
sustainable employability

A photograph of the Ring of Brodgar stone circle in Orkney, Scotland. The image is taken from a low angle, looking up at the silhouetted stones against a dramatic sky filled with orange and yellow clouds at sunset. The stones are dark and stand in a circular pattern.

BRAM FLEUREN

Caught somewhere in time

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**Conceptualizing, measuring, and predicting
sustainable employability**

DISSERTATION

To obtain the degree of Doctor at Maastricht University
on the authority of the Rector Magnificus, Prof. Dr. Rianne M. Letschert,
in accordance with the decision of the Board of Deans,
to be defended in public on Thursday 27 June 2019 at 12.00 hours

by

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Chapter 1

General introduction

Employment in work plays a central role in people's lives. Throughout history, mankind has engaged in various forms of labor for survival. As such, working can truly be understood as an "everlasting Nature-imposed condition of human existence" (Marx, 1867). Echoing this notion, about half the population (i.e. 8,500,000 people in the Netherlands) currently participates in paid work (CBS, 2017a), contributing to their desired standard of living (Fryer, 1995; Jackson, 1999; Jahoda, 1981). In addition to the material benefits, working under favorable conditions provides people with higher levels of well-being (Secker & Membrey, 2003), health (Schuring, Mackenbach, Voorham, & Burdorf, 2011; Schuring, Robroek, Lingsma, & Burdorf, 2015), and maintenance of valued competences (de Grip & van Loo, 2002). Conversely, involuntary job loss (e.g., due to poor mental or physical health or lack of skills) has major negative consequences for people in terms of for example stress (Clark & Oswald, 1994), income on the long term (Topel, 1990), depression (Gallo, Bradley, Teng, & Kasl, 2006), heart problems (Gallo et al., 2004), and health in general (Eliason & Storrie, 2009). This is not surprising as people can be observed to derive a significant part of their personal- and social identities from their occupation (Laliberte-Rudman, 2002; Townsend, 1997) and the organizations they are employed in (Hogg & Terry, 2000; Sluss & Ashforth, 2007). Finally, although arguably culturally dependent (Cole, 2007), employment in work also provides meaningful shared experiences, status, structure, social relationships, and purpose in life (Abma et al., 2016; Creed & Watson, 2003; Jahoda, 1981; Underlid, 1996; van der Klink et al., 2016; Wanberg, Griffiths, & Gavin, 1997). Therefore, the ability to gain and maintain employment over the life course, or essentially *sustainable employability*, can be considered vitally important for individuals.

For organizations, the availability of individuals who are sustainably employable is typically relevant as well. Organizations can marginally be conceptualized as a structured group of individuals pursuing some common goal(s) (Selznick, 1948). Following the notion that individual group members' (i.e. employees') characteristics are important input variables of group level outcomes (cf. Hackman & Morris, 1975; Ilgen, Hollenbeck, Johnson, & Jundt, 2005), individuals' abilities can be considered as a crucial determinant of organizational output. This is reflected by studies that document human capital and the effective management thereof (Barney & Wright, 1998; B. Becker & Gerhart, 1996) as a predictor of organizational productivity or performance. Additionally, the investments organizations make in recruitment, selection, and development of employees (Guest, 1997; Liu, Combs,

Ketchen, & Ireland, 2007), also point to the relevance of well-functioning employees for organizations. Similarly, the popular notion of “the people make the place” (e.g. Schneider, 1987), the ongoing ‘war for talent’ (e.g. Meyers & van Woerkom, 2014), and the very conceptualization of (traits of) individual employees as an organization’s ‘human resources’ (Kaufman, 2001; Pfeffer, 1998) or ‘human capital’ (G. S. Becker, 1964; Schultz, 1981), all point to well-functioning individuals as indispensable for organizations. Consequently, sustainable employability of these individuals can be a crucial topic for organizations. Indeed, depending contextual factors, an organization’s sustained competitive advantage can depend on its capability to effectively manage individual members’ long-term abilities to function at work (Barney, 1991; Huselid, 1995). As such, sustainable employability can – or in some cases should – be an important topic on organizations’ agendas.

On the societal level, a higher employment rate is associated with higher socio-economic welfare. Unemployment is “probably the most widely feared phenomenon of our times [that] touches all parts of society.” (OECD, 1994, p. 7). This claim is substantiated by positive relationships between unemployment and crime (Raphael & Winter-Ebmer, 2001), income inequality (Mocan, 1999), and a negative relationship between unemployment and consumer spending (Ganong & Noel, 2016). Moreover, Jacobsen and Schultz (1992) prove mathematically that decreasing unemployment increases welfare on the societal level. Additionally, it has been proposed that higher employment rates contribute to economic growth, for example through an accumulation of human capital and a higher aggregate income (Daveri & Tabellini, 2000) but also through lower unemployment benefit spending. Consequently, a society with higher employment rates can expect higher tax revenues and government expenditure (Chapman, 1993). Of course, maintaining a high employment rate over time requires individuals who are capable of participating in work over time (i.e. who are sustainably employable). Therefore, society as a whole benefits from the sustainable employability of its individual citizens.

Considering its relevance on the aforementioned three levels, sustainable employability seems a universal objective for individuals, organizations, and societies. That is, people generally want to be sustainably employable, organizations can benefit from the availability of sustainably employable individuals, and society benefits from a high long-term participation of individual citizens in work. For these reasons research on what sustainable employability is and how it can be achieved is essential.

Therefore, the present dissertation aims to provide clarity on these topics through a thorough analysis of the concept of sustainable employability and how it can be measured, as well as explorative studies on its determinants. In doing so, the focus will be on healthcare employees whose sustainable employability deserves extra attention. As such, the central research question of this dissertation is:

How can the sustainable employability of healthcare employees be conceptualized, measured, and predicted?

The remainder of this general introduction discusses the background against which this research question is considered. First, the next paragraphs consider why, besides being a universal goal, achieving sustainable employability is an urgent challenge. Second, the current state of sustainable employability research is briefly discussed to subsequently identify the several steps that must be taken in answering the research question. Third, this general introduction argues why sustainable employability is particularly important in the healthcare sector. Finally, an outline of the other chapters in this dissertation is provided.

Sustainable employability as a challenge

To understand the urgency of addressing the sustainable employability issue, the factors that contribute to its complicated nature should be considered. The first step in doing so is recognizing that sustainable employability is a socio-ecological issue that requires a systems perspective (cf. Churchman, 1979; Rooijackers, de Rijk, Horstman, Mulder, & Houkes, 2015). That is, although sustainable employability is an *individual* characteristic (see Chapter 2 and 3 of this dissertation), it is determined by the behavior of the individual, (elements of- and actors in) the work and work context, and, probably most strongly, societal factors, particularly in the form of labor market conditions and social security systems (cf. van der Klink et al., 2016). As such, several micro-, meso-, and macro level factors contribute to the urgent and challenging nature of sustainable employability.

The societal level

The first – and probably most widely recognized and discussed – aspect on the societal level that contributes to the urgency of sustainable employability is population aging. In most countries across continents, population aging can be observed (European Commision, 2017; UN, 2009). With the increased retiree-employee ratios that follow population aging, the costs of retirement and healthcare

increase (Alemayehu & Warner, 2004; Shah et al., 2007), which could reduce economic growth (Bloom, Canning, & Fink, 2010; Bloom, Canning, & Sevilla, 2003; Gonzalez-Eiras & Niepelt, 2012). This is particularly troubling in countries where retirement costs are borne by the society, as is the case in most European countries. As such, most of the EU countries attempt to reduce the effects of population aging on economic growth by increasing the official retirement age (Bloom et al., 2010; Bloom, Canning, & Lubet, 2015; European Commision, 2009; Gonzalez-Eiras & Niepelt, 2012). In the Netherlands, for example, early retirement schemes have been abolished and the mandatory retirement age has been raised from 65 in 2012 to 67 and three months in 2022, and will be linked to life-expectancy from 2022 onwards (Koolmees, 2017). However, it is unclear whether working lives can simply be extended without any facilitation. Additionally, the composition of the workforce changes to include a larger quantity of older employees. This, given the potentially different needs of older workers and the contributions to organizations they make (Abraham & Hansson, 1995; Bal, de Lange, Jansen, & van der Velden, 2012; Drabe, Hauff, & Richter, 2014; Kanfer & Ackerman, 2004; Kooij, de Lange, Jansen, Kanfer, & Dikkers, 2011; Kooij, Tims, & Kanfer, 2015), may require practice and policy changes (cf. Siegrist, Wahrendorf, von dem Knesebeck, Jurges, & Borsch-Supan, 2006). Therefore, research should focus on identifying the factors that facilitate people in working longer in this changing context, or rather, on identifying the antecedents of sustainable employability.

Promoting sustainable employability is further complicated by technological developments. Technological developments are frequently skill-biased; they favor highly skilled employees in terms of employability while disadvantaging low-skilled employees (Autor, Levy, & Murnane, 2003; Berman, Bound, & Machin, 1998; Berman & Machin, 2000; Machin & van Reenen, 1998). That is, working with complex technology may require (mastery of) specialized knowledge and skills. As such technological developments may shape labor market demands for employees with specific competences (Levy & Murnane, 2007) and thereby drive economic skills obsolescence. That is, a skill that is valued on today's labor market may not be valued tomorrow (de Grip & van Loo, 2002; van Loo, de Grip, & de Steur, 2001). As technology develops at an increasingly high pace, predicting which skills employees should have to maintain their employability becomes a complicated but increasingly urgent issue.

A third macro-level factor that complicates sustainable employability is globalization. As frequently argued, the work and work context are affected by globalization in several ways (Marquardt & Berger, 2003; Packer & Sharrar, 2003). For example, organizations in need of employees with specific competences can nowadays often draw from a global pool of candidates (Cohen & Zaid, 2002). Consequently, cultural diversity in the workplace increases, which can complicate the work context (Ryan & Wessel, 2015), arguably imposing additional demands (i.e. coping with diversity and fluency in English) on employees (Wilpert, 2009). Additionally, globalization may change several aspects of the work itself (Kelly, 2000), such as working times (Burgoon & Raess, 2009, 2011), the nature of contracts (de Ruyter & Burgess, 2000) and employment relations (Lakhani, Kuruvilla, & Avgar, 2013; Smith & Debrah, 2001), and, arguably, the quality of labor conditions (Lee, 1996, 2000; Reich, 2002). Moreover, demands for specific skills (e.g. communicating with people from other cultures) both on the labor market (Borissov & Hellier, 2013; Matsuyama, 2007) and within single organizations (Thoenig & Verdier, 2003) may change with globalization.

Finally, the urgent and challenging nature of sustainable employability can be observed in several labor market trends in the Netherlands. First, as of 2015, psychological complaints are the number one reason for incapacity for work in the Netherlands, accounting for a total 51% disability benefits recipients in 2017 (Schreuder, Eysink, & Hulshof, 2018). Additionally, between (i.e. depending on age) 17.9% and 46.1% of absenteeism is due to psychological complaints as well (Roelen, Verlage, Eysink, & Hulshof, 2018). These figures point to the relevance of decent psychosocial conditions at work. Moreover, the multifaceted (i.e. both mental and physical health based) nature of labor market work incapacity calls for integrative approaches to participation in labor, such as sustainable employability. Second, according to the Dutch unemployment insurance agency, labor shortages can be observed in several sectors such as healthcare, ICT, and construction (UWV, 2017). The sectoral specificity of these shortages could suggest they are at least partially due to a lack of *qualified* personnel. Additionally, they also indicate the relevance of sustaining current employees' abilities to remain employable in these jobs and, arguably, a need to invest in enabling others to become sufficiently qualified for these jobs to prevent further shortages. Third, despite these labor shortages, there is still a relatively large group of unemployed people and people with a distance to the labor market in the Netherlands. That is, about 350,000 people of the workforce are still unemployed (Statline, 2018a) and about 750,000

are labeled as having an incapacity for work (Statline, 2018b). Considering the potential negative effects of unemployment on, for example, one's later employment opportunities (Arulampalam, Gregg, & Gregory, 2001; Knabe & Rätzel, 2009), it seems important to find ways to facilitate (re)integration into paid work for these groups (cf. van Ruitenbeek, Zijlstra, & Hulsheger, 2018; Vornholt et al., 2017). After all, if the Netherlands truly aims to become a sustainable and inclusive society, these groups of people should be enabled and facilitated to participate in work as well (Zijlstra, van Ruitenbeek, Mulders, & van Lierop, 2017; Zijlstra, van Ruitenbeek, & Mulders, 2015). And fourth, the amount of flex-workers is with over 17% of the total population quite high in the Netherlands (CBS, 2018b). Although flex-work may have short-term benefits, it can also impair employees' long-term development at work (e.g. Kelliher & Anderson, 2008) and thus potentially their sustainable employability, particularly because flex-workers receive fewer relevant training opportunities (Fouarge, de Grip, Smits, & de Vries, 2012). Although these issues each warrant a separate treatise and are outside the scope of the present dissertation, they do underscore the urgent and challenging nature of sustainable employability.

The organizational level

For organizations the complicated nature of sustainable employability can be understood as a dilemma. That is, investments in sustainable employability could only have effects on the long term and may therefore not pay off for the investing organization, and potentially even benefit competitors (Ito & Brotheridge, 2005; Kluytmans & Ott, 1999; Loewenstein & Spletzer, 1999). That is, employees could move to other organizations before any sustainable employability investments have materialized (cf. G. S. Becker, 1964). As such, organizations could perceive investing in sustainable employability as a public goods dilemma (e.g. Allison & Kerr, 1994) and refrain from investing. Consequently, employees themselves would come to bear the full responsibility for their sustainable employability (cf. Fejes, 2010; Hallier, 2009; Marks & Huzzard, 2010). This, however, discounts the notion of corporate social responsibility (e.g. Lis, 2012; Turban & Greening, 1997), denoting a moral obligation for organizations to foster the well-being and growth of their employees (cf. Pfeffer, 2010). Moreover, accepting the systems view on sustainable employability (cf. Rooijackers et al., 2015), employers must recognize that conditions within their responsibility can harm or safeguard (e.g. working conditions) sustainable employability (cf. van der Klink et al., 2016). Additionally, in absence of mobility, adequate investments in sustainable employability likely do pay off and some investments can pay off on the short term as well (Kinnunen,

Mäkikangas, Mauno, Siponen, & Nätti, 2011; Luthans & Youssef, 2004; Valverde, Tregaskis, & Brewster, 2000; van Dam, 2004; van der Heijde & van der Heijden, 2006; Ybema, van Vuuren, & van Dam, 2017). As such, rather than focusing on what happens if they invest in their employees and they leave, organizations should consider what happens if they do not invest in their employees and they stay.

Even if there would be no dilemma, organizations would still need to know how they can actually invest in sustainable employability effectively. Currently, organizations can be observed to invest in their employees' sustainable employability in several ways. For example, Rooijackers et al. (2015) identify three approaches organizations take (i.e. encouraging the development of human resources; caring for health; and offering autonomy) and recognize sustainable employability as influenced by the socio-ecological context. Similarly, Sanders, Dorenbosch, and Blonk (2015) suggest that three approaches can be taken to improve employees' sustainable employability (i.e. development of human resources; mobility to other jobs inside or outside an organization; and work redesign to match job demands to employee abilities). Although these approaches seem intuitive and may likely contribute to sustainable employability, drawing conclusions on their effectiveness is complicated as sustainable employability as criterion has yet to be comprehensively conceptualized. The present dissertation aims to clarify how the effectiveness of such approaches can be established by conceptualizing sustainable employability further (Chapters 2, 3 and 4). Additionally, Chapter 6 of this dissertation aims to identify employment characteristics that have relevant effects on sustainable employability and organizations may intervene upon.

The individual level

For individual citizens taking care of sustainable employability may be quite daunting. As elaborated upon in the remainder of this dissertation, sustainable employability is an abstract, complex, and multidimensional concept. As such, getting a grasp on how to maintain their sustainable employability may be difficult for, arguably, a majority of the population. Additionally, individuals develop their career and go through their working life within one or multiple organization(s) within a societal context (cf. de Vos & van der Heijden, 2015; Vuori, Blonk, & Price, 2015). Consequently, they are subject to many factors (organizational and societal) they have little control over. Moreover, even if they would have control over all factors that influence their sustainable employability, individuals would also need to have the knowledge on what works and what does not. Although common-sense

could guide some positive contributions to sustainable employability, people can also make choices that are not beneficial for them in the long term (e.g. Hausman & McPherson, 2009; Sheshinski, 2003; Sunstein & Thaler, 2003). Therefore, individuals may have (partial) responsibility for maintaining their sustainable employability, but can hardly be expected to work things out on their own.

A note on systems and context

The importance of sustainable employability for organizations and society as a whole may depend on the context and active system considered. The extent to which organizations should care (i.e., besides an arguable moral obligation) or actually benefit from investing in sustainable employability can depend on their strategy, legal obligations, competitors, and the availability of workers in their niche market. For example, if organizations do not have the obligation to (co-)finance unemployment costs (e.g., as is the case in the United States) and there is a vast supply of workers, they could obtain a competitive advantage through exploitation of ‘disposable workers’ (cf. Moore, 1996). Although such approaches typically do not constitute feasible long-term strategies (Moore, 1996), not investing in sustainable employment (or only for a select group of employees) can benefit an organization that has no long-term concerns. Similarly, in societies where retirement is entirely funded by individual citizens themselves (e.g., many African countries), aging would be less of an issue in terms of public budget deficits and society could arguably care less about sustainable employability. These notions are reflected by the fact that most literature on sustainable employability stems from Europe, where retirement is largely publicly funded, employers are obliged to co-finance unemployment, and labor shortages are current. On the individual level, however, sustainable employability currently (i.e., it might change if everyone could lead a good life without working) seems to be relevant regardless of the system and context. Nonetheless, readers of the present dissertation should be aware that it is written in a European (i.e., Dutch) context and that system characteristics may shape the relevance of sustainable employability on different levels.

Current state of sustainable employability research

In line with the previous discussion, researchers have abundantly noted that sustainable employability is a complicated and urgent issue (e.g. Brouwers, Engels, Heerkens, & van der Beek, 2015; Leijten, van den Heuvel, Ybema, Robroek, & Burdorf, 2013; Rongen, Robroek, Schaufeli, & Burdorf, 2014; van der Klink et al., 2016; van Holland, De Boer, Brouwer, Soer, & Reneman, 2012), but what

solutions has research provided so far? This question is quite difficult to answer, as one would first need to establish what exactly qualifies as sustainable employability research. Doing so is not straightforward because the currently leading definition of sustainable employability (i.e. as formulated by van der Klink et al., 2016) still requires further conceptualization (as discussed extensively in Chapter 2 of this dissertation). Moreover, as elaborated on in Chapter 3 of this dissertation, the other several conceptualizations of sustainable employability that exist each have a slightly different angle and set of indicators (Brouwers et al., 2015; Le Blanc, van der Heijden, & van Vuuren, 2017; Noben, Nijhuis, de Rijk, & Evers, 2012; Oude Hengel, 2013; Peters, Engels, de Rijk, & Nijhuis, 2015; Sanders et al., 2015; van der Klink et al., 2016; van Harten, 2016; van Scheppingen et al., 2015; Ybema et al., 2014). Consequently, a common language for addressing sustainable employability has yet to be developed and the field is characterized by a variety of approaches.

The variety in approaches is not surprising as sustainable employability is inherently broad itself. This is nicely illustrated by (Brouwer et al., 2012) in their thorough review of research on the ‘sustainable employability’ of older employees that includes several studies with a broad array of variables that are considered to tap into sustainable employability. Most of the variables linked to sustainable employability are clearly relevant, but their diversity complicates substantiating uniform conclusions on how sustainable employability can be achieved. In that sense, research on sustainable employability could benefit from clear guidelines regarding what sustainable employability is. The present dissertation aims to address this need for conceptual development.

What follows from the variety of approaches is that sustainable employability should probably be treated as a multidimensional construct. That is, sustainable employability should roughly cover individuals’ ability to gain and maintain employment throughout the life course (the precise meaning of sustainable employability is further developed in Chapter 3). Essentially, this would mean that individuals would need to be able to function well at work, but also in the labor market and then on the long term. In line with the ICF framework for functioning (McDougall, Wright, & Rosenbaum, 2010), and the several indicators that have been used in attempts to capture it (Brouwers et al., 2015; Le Blanc et al., 2017; Noben et al., 2012; Oude Hengel, 2013; Peters et al., 2015; Sanders et al., 2015; van der Klink et al., 2016; van Harten, 2016; van Scheppingen et al., 2015; Ybema et al., 2014), sustainable employability is likely a multidimensional construct (Chapter

3). Moreover, as functioning at the very least encompasses health, competence, and well-being aspects (McDougall et al., 2010 and see Chapter 3), understanding sustainable employability likely requires multidisciplinary research. Given these considerations the present dissertation approaches sustainable employability from the perspectives of work and organizational psychology, occupational epidemiology, and labor economics.

Perhaps the variety in approaches towards sustainable employability also points to the relevance of recognizing it as a social construct. The variety in attempts to measure the construct could reflect that sustainable employability is not a reality that exists as a ‘noumenon’ or a ‘thing in itself’ (Kant, 1787). That is, sustainable employability does not correspond to some(thing that can be traced to a) physical (e.g. biological) reality (cf. Gruijters & Fleuren, 2018). That is, – and this point is derived from Chapter 4 of the present dissertation – it is unlikely that individuals truly have a certain sustainable employability that could be conceived as a biological or psychological characteristic (such as, arguably, intelligence). Rather than being a real phenomenon, sustainable employability should be recognized as having emerged as an artificial topic society came to care about and considers interesting to describe and predict. Following this line of thinking, what sustainable employability is depends on what it should be given its two constituents (i.e. sustainability and employability) and the contribution it is to make to society (i.e. identifying how citizens’ participation in work can be optimized). In that sense, rather than a latent trait of individuals, sustainable employability is a social construct that provides a *description* of an individual’s ability to function. This could explain the variety in conceptualizations and the difficulty in reaching agreement. That is, as discussed and demonstrated in Chapter 4 of this dissertation, recognizing sustainable employability as a social construct has extensive implications on its measurement and validation.

The inherently longitudinal nature of sustainable employability further complicates drawing any conclusions from existing research on the topic. That is, as also argued in Chapter 3, the notion of sustainability and the life course component imply that sustainable employability requires a long-term perspective (e.g. van der Klink et al., 2016). Problematically, however, most existing research on sustainable employability uses cross-sectional designs (see Chapter 3). Regardless of the relevance of the variables involved in such studies, the viability of drawing conclusions regarding predictors of sustainable employability can therefore be

questioned. One specific complicating factor – as elaborated on in Chapter 5 of this dissertation – is that when sustainable employability is considered over time, age and cohort effects need to be taken into account as well (e.g. O'Brien, 2000). This is of particular importance for sustainable employability research, as it is not uncommonly assumed that sustainable employability is an age-related issue (e.g. Brouwer et al., 2012). Whether this assumption is correct should be considered thoroughly and Chapter 5 provides a first step into that direction. If anything, these points illustrate that cautiousness is required when drawing conclusions on antecedents of sustainable employability based on existing research.

Finally, with regard to sustainability in a work context, several other – potentially relevant – concepts exist and it is unclear how these relate to sustainable employability. First, sustainable *employment* is sometimes used as synonym of sustainable employability (e.g. van Dam, van Vuuren, & Kemps, 2017), but also treated as a topic on its own (e.g. McCollum, 2012). However, sustainable employment has an even less clear conceptualization than sustainable employability. Second, the similar concepts of sustainable *work* and sustainable *work ability* also appear in the international literature (e.g. Eurofound, 2015; Kira, van Eijnatten, & Balkin, 2010). Although definitions for these concepts are available, it is unclear how they relate to sustainable employability. Third, arguably on a more aggregate level, there are concepts such as the sustainable career (e.g. de Vos & van der Heijden, 2015), sustainable working lives (e.g. Vuori et al., 2015), sustainable organizations (e.g. Perrott, 2015), and sustainable human resource management (e.g. App, Merk, & Büttgen, 2012). Again, these concepts could arguably be related and partially cover overlapping conceptual domains as sustainable employability. However, as long as their relationships to sustainable employability are unclear, research on these concepts cannot be used to draw any conclusions on the antecedents of sustainable employability. Chapter 3 of this dissertation aims to contribute to clarity on some of these concepts by positioning sustainable employment, sustainable work, and sustainable work ability in a comprehensive conceptual framework for sustainable employability.

In conclusion, the current state of sustainable employability research can best be labeled as ‘under construction’. That is, conceptual clarity, guidelines for valid measurement, and longitudinal research are needed before one can convincingly claim to promote sustainable employability. Fortunately, it is possible to draw on insights from existing research (e.g. the research cited in this chapter) on functioning

at work and in the labor market. Nonetheless, when directly considering sustainable employability, we still seem to be at the very cradle of its research tradition and it is essential to slow down and act accordingly.

Sustainable employability of healthcare employees

If sustainable employability is so essential and conceptual development is needed, then why already focus on healthcare employees in this dissertation? It should first be noted that the focus of this dissertation is mainly on the conceptualization of sustainable employability. That is, although the ultimate aim of this dissertation is to identify the factors that facilitate sustainable employability for healthcare employees, this aim can simply not be attained without a proper general conceptualization of sustainable employability. Therefore, Chapters 2-5 of this dissertation address essential steps in conceptualizing sustainable employability, and only Chapter 6 focusses on healthcare employees specifically. As elaborated below, this focus on healthcare employees is essential, as these workers form a vitally important group whose sustainable employability is at risk.

Maintaining the sustainable employability of healthcare employees is particularly important because of population aging. Population aging simultaneously increases the demand for- and reduces the supply of healthcare employees. First, longevity increases the burden on the healthcare system as older people typically have more health complaints (Alemayehu & Warner, 2004; Shah et al., 2007). This higher demand for care can be expected to require a large amount of healthcare employees as well. However, as the workforce constitutes a smaller proportion of the population, the supply of employees may become insufficient. Indeed, according to the UWV (the Dutch Public Employment Services) labor shortages are already an issue in the Dutch healthcare sector (van der Aalst, 2018). Perhaps technological developments could reduce the need for healthcare employees. In that case, however, working in healthcare could become even more skill-biased, requiring a constant updating of the competences of healthcare employees (cf. Autor et al., 2003). Moreover, healthcare arguably has an inherently social component that may necessitate a human touch and the extent to which technology (e.g. care robots) can curb future labor shortages is questionable. Either way, it seems necessary to sustain the long-term employability of healthcare employees in order to maintain or improve the utility value of the healthcare system (i.e. achieve sustainable healthcare).

The sustainable employability of healthcare employees is at risk for several reasons. First, according to CBS data on psychosocial working conditions across sectors in the Netherlands, healthcare employees face the highest levels of work pressure and emotional demands at work (CBS, 2016), the lowest levels of autonomy, and are most frequently victims of violence and intimidation at work (CBS, 2018a). Second, healthcare employees in the Netherlands are only second to teachers, when it comes to experiencing burn-out complaints (CBS, 2018a). Moreover, healthcare employees face several physical demands as well. For example, more than any other group of employees in the Netherlands, those in the healthcare sector need to complete tasks that require physical strength (CBS, 2017b) and working in uncomfortable positions (Hooftman et al., 2018). Third, the aforementioned technological developments are particularly apparent in the healthcare sector (e.g. Bartram & Dowling, 2013; Cooke & Bartram, 2015). That is, a tendency towards implementing technology can be observed as the healthcare sectors aims to curb the rising healthcare costs (e.g. Venkatesh, Zhang, & Sykes, 2011). Consequently, healthcare employees may face skill maintenance requirements, while already being employed in highly demanding jobs. Finally, the increasing implementation of self-managing teams (Maurits, de Veer, Spreeuwenberg, & Francke, 2014) as well as the integration of healthcare services (e.g. care across organizational boundaries and specializations (e.g. Fleuren, Willems, van Hoof, Quanjet, & Westra, 2017) or patient centered care (e.g. van Hootegem & Dessers, 2017)), also increase demands for skills, particularly in the social domain. Although some of these work characteristics can have beneficial effects, seeing how this cocktail of job demands and psychosocial factors complicates healthcare employees' sustainable employability requires little imagination. Nonetheless, the following case study briefly demonstrates a few examples.

A case study in South Limburg

To gain insights into the complicated and multifaceted nature of healthcare employees' sustainable employability, an in-depth case study was conducted as starting point of this dissertation. The case study provides various relevant insights into the complicated nature of healthcare employees' sustainable employability. The study was conducted in a Dutch healthcare organization with about 110 employees in South Limburg that provides supported living arrangements for people with some (combination of) mental and/or physical impairment(s). The organization took part in the study, as it was committed to gain insight in factors promoting or harming the sustainable employability of their employees.

The first part of the study consisted of interviews with both managers and employees. The interviews centered on what aspects of working at the organization concerned could contribute to or harm the sustainable employability of its employees. Factors employees and managers thought were contributing to sustainable employability included satisfaction derived from reaching goals with clients, autonomy at work, influence in decision-making, quality of the managers, social connections with co-workers, variation in work, recognition, and the fact that the organization takes care to match the job demands to the abilities of the employees. As potential threats to sustainable employability, managers and employees mentioned changes in working with ICT, administrative workload, dealing with difficult clients, work-pressure, distorted work-life balance, and communication with co-workers. Both the managers and employees in the organization mentioned that, there were little opportunities for career development because of the limited size of the organization. Additionally, some employees were suffering from mild health complaints, which they thought could be related to their work. Managers and employees both considered sustainable employability an important theme and thought that the organization used an individual-focused approach to it. However, employees thought that the individual focus could lead to unfair advantages for some employees. Additionally, the current focus was described as curative, whereas employees and managers would prefer a preventive focus towards promoting employees' sustainable employability.

The second part of the study consisted of a three-wave survey among all employees within the organization. The three waves were each six months apart and participation rates ranged from 60 to 50 percent in each wave. However, employees typically did not participate in all three waves, resulting in data of only 25 percent of employees across the entire study. As such, the findings should be considered with some caution, but they do provide directions and an indication of the type and extent of the sustainable employability issue in healthcare. Several aspects repeatedly surfaced as predictors of sustainable employability as a whole and its individual indicators. Aspects that were positively related to sustainable employability included being treated in a personal and caring way by managers, being able to share worries and opinions, positive perceptions of HR policies, being able to trust team members, effective conflict management, procedural justice, a high person-job fit, and work-life balance. Negative predictors of sustainable employability included work pressure, boredom during work, physically demanding work, dealing with aggressive clients, and encountering situations that provoke anxiety at work.

Both parts of the study demonstrate the multifaceted nature of sustainable employability: various aspects in several domains are identified as contributing to or harming sustainable employability. Clearly, the healthcare employees in this case study face demands that require them to maintain their skills (i.e. observed need for development and difficulties in dealing with ICT), demands in the social domain (i.e. several social aspects of working are identified as antecedents of sustainable employability), and high work-pressure and low work-life balance, that affect their sustainable employability. If anything, these findings show that contemporary work in healthcare can be demanding and thus affect sustainable employability in several ways. As such, it is paramount to map the conditions that affect sustainable employability substantively.

Based on this case study and the current state of affairs in healthcare, an important conclusion regarding the sustainable employability of healthcare employees can be drawn: We clearly need to take care of our caretakers. And this will take more than just putting fruit in the lunchroom...

Outline of the dissertation

From this general introduction it can be concluded that sustainable employability research is necessary, but also that it finds itself in an early stage of development. The following chapters aim to contribute to the development of sustainable employability research by proposing a comprehensive conceptual model that is used to formulate and test predictions regarding sustainable employability. Starting from the very definition of sustainable employability, each chapter goes a step further in unraveling what sustainable employability is and how it can be achieved. Consequently, the Chapters 2 to 5 concern the general conceptualization of sustainable employability. Chapter 6 then applies the developed framework to identify sectoral differences in sustainable employability and how the sustainable employability of employees in the healthcare sector can be promoted.

Chapter 2 discusses the currently leading definition of sustainable employability in the international scientific literature. Specifically, the chapter provides a short critical examination of both the merits and point for further development of Van der Klink et al.'s (2016) definition. In short, the merits of this definition as identified in this chapter are that the definition succeeds in recognizing (i) sustainable employability's complex longitudinal nature; (ii) sustainable employability's multidimensional character; and (iii) the relevance of both the individual employee

and the work context. Points for further development that are proposed are that a future definition should (i) label aspects that constitute sustainable employability explicitly; (ii) treat sustainable employability as an individual characteristic; (iii) explicate a clear distinction between causes and effects in the context of sustainable employability; (iv) make sustainable employability applicable to unemployed individuals; and (v) specify how sustainable employability's inherently longitudinal nature can be addressed. By elaborating on these points, Chapter 2 explicates the necessity of a more comprehensive definition and sets the stage for formulating one.

Chapter 3 reviews existing approaches to sustainable employability to formulate novel definitions and a conceptual framework for sustainable employability and sustainable employment. Specifically, sustainable employability is defined as a multidimensional individual characteristic that should be considered over multiple time points throughout an individual's working life. As such, sustainable employability's 'employability' component can be captured by considering nine complementary variables that describe an individual's ability to function at work and in the labor market. Consequently, sustainable employability's 'sustainability' component can be captured by considering the development of the employability component over time. This development is identified as an outcome of individuals' exposure to interacting work (e.g. job demands, and job resources) and work contextual characteristics (e.g. team, organization, and society) that, together with an individual's own characteristics (e.g. age, gender, and personality) and behavior (e.g. effort), shape their employment situation. This employment situation can be labeled as sustainable when it does not affect an individual's sustainable employability negatively over time. With these characteristics the resulting framework in Chapter 3 provides a comprehensive and specific approach for measuring and researching sustainable employability.

Chapter 4 examines the validation of sustainable employability's measurement model. That is, building on the definition of SE as proposed in Chapter 3, the nature of sustainable employability's measurement model as either formative or reflective is investigated. Considering sustainable employability's multidimensional nature and the conceptual complementarity of its indicators, sustainable employability is identified as a formative construct. This has major theoretical implications, namely (i) sustainable employability is a social construct that, although interesting to study, does not correspond to a real latent individual characteristic; (ii) interventions aiming to affect sustainable employability can target its indicators; (iii) its indicators

are not required to co-vary and as such regular psychometric approaches (i.e. factor analyses) cannot be used. Considering this final implication, validating sustainable employability's measurement is explored by alternative modeling approaches to assess criterion and construct validity. That is, several structural equation models (SEM) including the indicators of SE and 'perceived ability and willingness to work until the official retirement age' as criterion variable are fitted. Through this approach sustainable employability's formative measurement model is validated as far as possible, enabling future research to measure sustainable employability. Additionally, Chapter 4 provides a practical general illustration of handling constructs with a formative measurement model through the application of SEM.

Chapter 5 explores age and period effects on sustainable employability and its nine dimensions. As sustainable employability is captured in terms of development over time, there would be no point in identifying work and work contextual characteristics or trying to intervene on them if all variance in sustainable employability is explained by age. Moreover, sustainable employability is typically linked older employees, although there is no empirical basis to assume they are less capable of functioning in work than others. Importantly, age effects may be distorted by period and cohort effects if they are not included in the model. As such, Chapter 5 explores how age is related to sustainable employability while correcting for period effects. Only marginal effects of age are found on the perceived health status and perceived employability dimensions of sustainable employability. Additionally, time effects are found on the dimensions of job performance, fatigue, and skill-gap. Moreover, substantial variance exists in sustainable employability and each of its dimensions over the two time points. These findings suggest that age may not be as important to consider, contrary to what is typically assumed in sustainable employability research. Additionally, considering the within-person changes over a period as short as two years, the approach of tracking change in sustainable employability over time as proposed in Chapter 3 seems feasible.

Chapter 6 considers antecedents of the sustainable employability of healthcare employees specifically. To this end, the chapter first investigates the extent to which sustainable employability is affected by the sector in which employees are employed. That is, employees in the healthcare sector are compared to those in four other sectors (i.e. industry, transportation, finance, and public administration) in terms of how their sustainable employability develops over a period of two years. Differences in sustainable employability were found, legitimizing an in-depth study

of sustainable employability of healthcare employees specifically. Consequently, the second part of Chapter 6 includes several potential antecedents of sustainable employability and each of its dimensions for healthcare employees specifically. From the analyses task variety and organizational tenure are identified as positive and being personally attacked and threatened during work as negative predictors of sustainable employability overall. With regard to sustainable employability's separate indicators, several employment characteristics are identified, mainly in the psychosocial, working time arrangements, and development oriented HR practices domains. Specifically, these findings suggest that healthcare organizations should facilitate a safe working climate as well as provide meaningful (i.e. varied and autonomous) work. Additionally, although they can be beneficial in stimulating employability, healthcare organizations should be aware of potential negative side effects when offering development oriented HR practices.

Chapter 7 provides a general discussion of the conceptual developments and findings in this dissertation. The chapter particularly considers the general meaning and validity of the findings, the implications of the findings as a whole, as well as directions for future research on sustainable employability.

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Chapter 2

Critical reflections on sustainable employability's leading definition

This chapter is based on: Fleuren, B. P. I., de Grip, A., Jansen, N. W. H., Kant, I., & Zijlstra, F. R. H. (2016). Critical reflections on the currently leading definition of sustainable employability. *Scandinavian Journal of Work Environment & Health*, 42(6), 557-560. doi: <https://doi.org/10.5271/sjweh.3585>

Abstract

Sustainable employability (SE) is an important topic as it deals with employees' abilities to function adequately at work and on the labor market throughout their working lives. However, until now there has been only one attempt to define sustainable employability in the international literature (1). This first definition is a valuable contribution to the field as it rightfully (i) describes sustainable employability as a multidimensional concept; (ii) recognizes the importance of both employee and work characteristics; and (iii) acknowledges the inherently longitudinal nature of sustainable employability. Despite these merits, we argue that this definition has some serious omissions which are important in capturing sustainable employability comprehensively. Specifically, we argue that the definition of SE could be improved in various ways, namely it should: (i) clarify *which aspects* of employment constitute someone's sustainable employability; (ii) not counter-intuitively treat sustainable employability as a characteristic of both the job and the employee simultaneously; (iii) not be based on the insufficiently tested assumption that achieving value in work inherently leads to sustainable employability; (iv) be formulated in a way that sustainable employability can also apply to unemployed individuals; and (v) adequately specify how the inherently longitudinal dimension of sustainable employability should be addressed. We would like to contribute to the discussion by providing guidelines for a new adjusted definition of sustainable employability that could facilitate further research on this important concept and its determinants.

Introduction

Sustainable employability (SE) is a topic of vital importance to individual employees, organizations and society alike. SE generally refers to employees' capacities to function in work throughout their working life. As participation in work is important for individuals, organizations and society as a whole, individuals' ability to function in work is essential. For individuals, work provides meaning, financial security as well as social contacts. Organizations need productive employees to survive. Also from a societal perspective, it is important that as many people as possible participate in the labor market to maintain economic welfare (van der Klink et al., 2016). Moreover, as a consequence of population aging (Alemayehu & Warner, 2004; Bloom, Canning, & Sevilla, 2003; Bos & von Weizsäcker, 1989; Shah et al., 2007; UN, 2009), longevity, rapid changes in technology (Autor, Levy, & Murnane, 2003; Machin & van Reenen, 1998) and changes in the nature of work (van der Klink et al., 2016), both the need to promote sustainable employability of individuals in society and the complexity to succeed in doing so increase even further.

Only recently, van der Klink et al. (2016) provided the first definition of the concept in the international scientific literature (p. 74):

"Sustainable employability means that throughout their working lives, workers can achieve tangible opportunities in the form of a set of capabilities. They also enjoy the necessary conditions that allow them to make a valuable contribution through their work, now and in the future, while safeguarding their health and welfare. This requires, on the one hand, a work context that facilitates this for them and on the other, the attitude and motivation to exploit these opportunities".

This definition is accompanied by an equally recent operationalization of SE as a set of capabilities (Abma et al., 2016). Moreover, the definition itself also appeared in an earlier Dutch publication (van der Klink et al., 2010), which other international publications on SE most commonly refer to (i.e. in comparison with other definitions in the non-international (e.g. Dutch) literature) (Brouwers, Engels, Heerkens, & van der Beek, 2015; Peters, Engels, de Rijk, & Nijhuis, 2015; van Holland, De Boer, Brouwer, Soer, & Reneman, 2012). As mentioned, the present paper provides a critical reflection on van der Klink et al.'s (2016) aforementioned definition of SE.

Merits

Van der Klink et al.'s definition of SE (2016) has three important merits.

First, SE is seen as a multidimensional construct. It is presented as consisting of a broad set of opportunities for employees to create value for themselves and for their employer that cover various aspects of working. Moreover, the individual's health and well-being as well as attitudinal and motivational aspects are included in the definition as well. This acknowledgement of the multidimensionality of sustainable employability is favorable, as it illustrates the complexity of the construct and of what constitutes functioning in work. This is in accordance with the International Classification of Functioning, Disability and Health (ICF; World Health Organization (2001)), in which functioning is seen from three different perspectives (body, activities and participation). The ICF underlines the multifaceted and complex nature of functioning in which disease, environmental factors, and personal factors play a role. Similarly, the multifaceted nature of functioning is also illustrated by the fact that different disciplines focus on different aspects to understand functioning at work (Brewer, 1999; Fuchs, 2000).

Second, SE is (partially) defined as the degree to which (i) employees are able to work throughout their entire working lives, and (ii) the degree to which their work context enables them to do so. This suggests that SE is a set of interacting characteristics of the employee and the work-context that co-determine the opportunities and conditions affecting employees' capacity to participate in the labor market throughout their working lives. As such, the definition describes an equal responsibility for employee and employer to maintain the employee's ability to work. This could be considered as a great merit, as research shows how strongly an employee's ability to function is influenced by the individual, work, and work contextual factors (Kristof-Brown, Zimmerman, & Johnson, 2005).

Third, van der Klink et al.'s definition (2016) recognizes that sustainable employability is an inherently longitudinal construct as clearly embedded in the words "throughout their working lives". This is essential as 'sustainable' necessarily implies a time dimension.

Needs for further development

Despite the aforementioned merits, there are important needs for improvement of van der Klink et al.'s definition of SE.

First, it is not immediately clear from the definition which particular element(s) of the work situation constitute(s) SE. The paper provides some clarity by equating SE with the capability set it propagates, as evidenced by these statements: "... in an accompanying paper also published in this issue, we report on the development and validation of a questionnaire that allows for the assessment of sustainable employability based on the concept of capability" (van der Klink et al. (2016), p. 72) and "This [capability] set, in our view, represents the best possible operationalization of sustainable employability" (van der Klink et al. (2016); p. 74). However, in the paper SE is also referred to as being determined by a worker's capability: "this model holds that an individual's sustainable employability is determined by how he or she succeeds in converting resources into capabilities, and subsequently into work functioning, in such a way that values such as security, recognition and meaning are met" (van der Klink et al. (2016), p. 72). As it is not feasible that SE is predicted by itself in the form of a capability set, perhaps the capability set does not actually refer to SE itself but rather to a favorable employment situation that may cause sustainable employability. More clarity on this issue is needed.

Second, the definition seems to treat SE as a characteristic of both the job and the individual at the same time. This is counter-intuitive and problematic as the job and work-context may *predict* an individual's ability to be sustainably employed, but they *can never be* aspects that are part of SE. Instead, employability is a characteristic of the individual alone. Of course the individual's ability to be employed does depend on work and work-contextual factors, but these should be predictors and not be embedded in the construct itself. For an adequate definition of SE it is essential to disentangle these relationships between causes (employment) and effects (employability). Moreover, future approaches should treat SE as an individual characteristic that is an outcome of the complex interaction between other individual, work, and work contextual characteristics.

Third, the definition and operationalization of SE assume that achieving value in work inherently predicts SE and that, therefore, SE can be conceptualized as achieving value in work. This is problematic, as before such claims can be made, such

relationships need to be tested with SE as criterion. This is, however, impossible within the approach van der Klink et al. (2016) provide, as SE is equated with its predictor(s). Therefore, similar to the first conceptual issue, it seems unlikely that the capability set adequately reflects SE.

Fourth, the definition by van der Klink et al. (2016) suggests that SE only applies to individuals who are employed. In the publication by Abma et al. (2016), which accompanies the definition-paper by van der Klink et al. as a validation paper, this is shown by the way in which capabilities are measured. Moreover, the definition also suggests this because individuals can only be considered to be sustainably employable if their work-context enables them to achieve tangible opportunities. However, individuals who are not currently working can still be highly employable for work and even sustainably so, but just be in between jobs. It is therefore not required for individuals to be enabled by their employer to be sustainably employable. Consequently, in line with our aforementioned points on improving the definition, being enabled by an employer to achieve value may be an important predictor of SE, but it is not necessarily part of SE itself. Moreover, future approaches to SE should define the concept in such a way that it is applicable to every individual regardless of employment status.

Finally, the definition and operationalization of SE in the form of a capability set do not include any specification on how the longitudinal aspect of SE should be captured. The definition rightfully acknowledges the longitudinal dimension of SE, but its operationalization focuses solely on achieving value. Although achieving value at work may be an important predictor of SE, a complete operationalization and definition should include its longitudinal nature as well.

Outlook

In conclusion, while Klink et al.'s (2016) definition of SE does have strong merits, it requires further improvement. The approach's main drawback is that capabilities seem more apt at describing a potentially important set of predictor(s) of SE than at capturing the construct itself. Either way, future developments in conceptualizing SE should build on the aforementioned merits, but also define SE in a way that (i) clearly labels which aspects of the employment situation constitute SE; (ii) explicitly separates causes and effects; (iii) treats SE as an individual characteristic that may

be affected by other employment characteristics at the individual, work, and work-contextual levels; (iv) makes the concept applicable to any individual regardless of their employment status; and (v) clearly addresses the longitudinal nature of SE as embedded in the word 'sustainable'. These guidelines should not only enable the development of an appropriate definition of SE but also a conceptually sound way of measuring the construct.

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Chapter 3

Towards a comprehensive framework for sustainable employability

This chapter is based on: Fleuren, B. P. I., de Grip, A., Jansen, N. W. H., Kant, I., & Zijlstra, F. R. H. (Submitted Manuscript). Unshrouding the sphere from the clouds: Towards a comprehensive conceptual framework for sustainable employability.

Abstract

Sustainable employability refers to individuals' long term abilities to work and remain employed. Despite its societal importance in the light of aging populations and rapidly-changing skill demands, sustainable employability still requires further definition and conceptualization. As such, the present paper aims to define and conceptualize sustainable employability comprehensively by reviewing existing studies on the concept. Additionally sustainable employment, sustainable work, and sustainable work ability are discussed and integrated into our broad framework of sustainable employability. The resulting conceptual framework positions sustainable employability as an inherently longitudinal multidimensional individual characteristic that is the outcome of complex interactions between individual-, work- and work environmental characteristics. This framework enables researchers to identify the employment characteristics that promote sustainable employability and thereby comprise sustainable employment. Finally, the framework is linked to notions of person-environment fit, and job- and organizational design to create a basis for future research on sustainable employability.

Introduction

Sustainable employability (SE) generally refers to employees' capacities to function in work and on the labor market throughout their working lives (e.g. van der Klink et al., 2016). For individuals, this ability to work is essential as working provides purpose in life, financial security, and social contacts, as well as safeguards health (Schuring, Mackenbach, Voorham, & Burdorf, 2011) and well-being (Gowan, 2014; Lee et al., 2017). Similarly, to function sustainably themselves, organizations need employees who are capable of functioning on the long term as well (e.g. Hall, 1993). As such, organizations are shifting the focus of their human resource management (HRM) policies and practices from strategic to sustainable HRM (Ehnert, Parsa, Roper, Wagner, & Muller-Camen, 2016; Kramar, 2014). Equivalently, on the societal level, prolonging the labor participation of individual citizens fosters economic welfare (Jacobsen & Schultz, 1992). However, population aging (Alemayehu & Warner, 2004; Fisher, Truxillo, Finkelstein, & Wallace, 2017; Shah et al., 2007), rapid changes in technology (Autor, Levy, & Murnane, 2003; Machin & van Reenen, 1998) and changes in the nature of work (Cartwright & Holmes, 2006; van der Klink et al., 2016), complicate promoting SE of the working population during extended working lives (Cascio, 2017; van Dam, van Vuuren, & Kemps, 2017). Therefore, a thorough scientific understanding of SE and its determinants is necessary.

Problematically, a comprehensive framework for SE is still missing in the literature. That is, the currently leading (i.e., most cited) definition of SE in the international literature (van der Klink et al., 2016), has been subject to criticism (Fleuren, de Grip, Jansen, Kant, & Zijlstra, 2016). Other conceptualizations of SE do exist, but these seem less advanced and comprehensive yet. Consequently, the concept of SE has no clear meaning and results cannot be compared across studies. Additionally, studies on the topics of sustainable employment, sustainable work (Eurofound, 2015), and sustainable work ability (Kira, van Eijnatten, & Balkin, 2010) also emerge in the literature. However, how these topics and SE are related and to what extent they can be integrated in a comprehensive framework remains unclear. In sum, further clarification on what SE is, how it relates to workers' employability, sustainable employment, sustainable work, and sustainable work ability, and how it can be operationalized is needed. To fulfill this need, we review existing conceptualizations of SE and integrate research on sustainability in the context of employment as well. Thereby, we aim to provide a comprehensive framework that enables future research on the crucial topic of SE.

Our approach of developing a framework for SE consists of four steps. First, we consider the terms ‘sustainable’ and ‘employability’ at the fundamental semantic level to formulate a basic definition of SE. Second, having a basic definition of SE as reference point, we consider existing approaches to SE to identify essential elements that should be included in a comprehensive framework for SE. Third, we integrate the existing approaches into our basic definition of SE. And fourth, we consider sustainable employment, -work, and -work ability, to integrate these concepts in our conceptual framework as well. Afterwards, we discuss implications for future research and practice.

‘Sustainable’ and ‘employability’

Starting at the basic semantic level, ‘sustainable employability’ consists of the noun ‘employability’ that is to qualify as ‘sustainable’. Turning to the noun first, a basic definition of employability is “capable of being employed” (MWOD, 2018a). When the object that has this capability is the employee, employability thus refers to that individual’s capability to be employed in work. Although very basic, this definition does match scientific definitions of employability. For example, de Grip, van Loo, and Sanders (2004) define employability on the individual level as “the capacity and willingness of workers to remain attractive for the labor market” (p. 216). Similarly, Fugate, Kinicki, and Ashforth (2004) refer to employability as “one’s ability to identify and realize career opportunities” (p. 23). What these and more historical definitions (e.g. Gazier, 1999; Hillage & Pollard, 1998) of employability have in common, is that employability is an individual characteristic that is determined by various (internal and external) factors, and describes how well an individual is capable of being (i.e. becoming and maintaining to be) employed in work. As such, employability should capture *an individual’s capacity to function at work, but also on the labor market*.

The adjective ‘sustainable’ applies to something that is “able to be used without being completely used up” (MWOD, 2018b). In line with the substance oriented meaning of sustainability (Kramar, 2014), this simple definition focusses on maintenance of resources despite their use. Others have proposed that maintenance is necessary, but that sustainability also implies positive development and added value for the stakeholders and the environment (e.g. Finkbeiner, Schau, Lehmann, & Traverso, 2010; Newman, 2005). Finkbeiner et al. (2010) further argue that such developments and their effects should be considered over the life cycle of the resource concerned. Similarly, the World Commission on Environment and

Development (1987) defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Kuhlman & Farrington, 2010). In sum, sustainability can be understood as the *use* of a *resource* over time, without the *utility value* of that resource being negatively – and preferably positively – affected by its use.

Basic definition of SE

Applying the aforementioned conceptualization of sustainability to the employment of individuals, a basic definition for SE can be constructed. That is, the *resource* that is used in the context of employment is the *individual* (employee), the *use* is the *employment* of that individual in work, and the individual's *utility value* is the extent to which the individual can be employed, or rather, their *employability*. In that sense, an individual's 'employability' can be defined as *sustainable employability*, when it is not negatively (and preferably positively) affected by that individual's employment over time. Importantly, 'employability' is parenthesized as it still broadly refers to an individual's capacity to function at work and in the labor market.

Although very basic, the aforementioned definition captures the role of time, but potentially also the added value for stakeholders and life cycle aspects of sustainability as well. First, the inherently longitudinal component of SE is explicated in the aforementioned basic definition of SE by considering an individual's 'employability' over time. As discussed later, the existing conceptualizations of SE have not yet explicated this aspect to the same extent. Second, the added value for stakeholders (Newman, 2005) can also be addressed with this basic definition of SE if 'employability' is conceptualized in a sufficiently broad way. That is, if 'employability' can be considered to include health and well-being (cf. van der Klink et al., 2016), the added value for the individual as stakeholder is clear. Note that this would also be required by the longitudinal aspect of SE, as health and well-being are crucial for an individual's long-term ability to function at work and in the labor market. For employers and society as the other main stakeholders, the added value is also relatively clear. That is, employees with high SE are beneficial for employers (Hall, 1993) and society benefits from high employment rates (Jacobsen & Schultz, 1992). Third, to cover the life cycle aspect (Finkbeiner et al., 2010) SE should ideally be considered throughout an individual's working life. Although this is theoretically desirable, it is practically almost impossible to monitor individuals throughout their working lives. As the basic definition only requires SE to pertain to specific periods within an individual's working life, there is no necessity to consider the entire

working life, but the option to do so is still open. In sum, the basic definition can adequately cover both the ‘sustainability’ and ‘employability’ components of SE. Both components are specified further in the present paper.

Two theoretically important derivations can be made from our basic definition of SE. First, as SE is defined as ‘employability’ not being negatively - and preferably positively - affected by an individual’s employment over time, a method for adequately capturing SE can be derived. That is, assuming that ‘employability’ can be measured, the ‘sustainability’ component can be captured as the change in ‘employability’ over time. Positive change or stability would then indicate sustainability, whereas negative change over time would indicate a lack thereof. Consequently, by relating change in ‘employability’ over time to individual-, work-, and work-contextual aspects, determinants of SE can be identified. Importantly, this approach requires that ‘employability’ can be measured in such a way that it captures an individual’s ability to function in work and on the labor market comprehensively. Second, as SE is by definition an outcome of employment, a basic definition for sustainable employment as ‘predictor’ can be derived as well. That is, if employment conditions do not harm SE, the situation can be referred to as sustainable employment. We elaborate on to these two points after reviewing existing approaches to SE.

Proposition 1

At the most basic level, sustainable employability means that an individual’s ‘employability’ is not negatively, and preferably positively, affected by that individual’s employment over time, where...

- a) *‘Employability’ in the conjoint term ‘sustainable employability’ is an individual characteristic that should encompass an individual’s ability to function at work and in the labor market.*
- b) *The ‘sustainability’ component of SE can be captured by considering the development of ‘employability’ over time, making SE an inherently longitudinal construct.*
- c) *Sustainable employment can be inferred from an individual’s situation in which SE is not negatively affected by employment over time.*
- d) *The main stakeholders involved (i.e. individuals, society, and potential employers) inherently benefit from SE.*

Reviewing existing approaches to SE

To further develop the aforementioned basic definition, we now consider existing conceptualizations of SE to identify essential components for a comprehensive conceptualization. In this discussion, we first turn to SE's most cited conceptualization (i.e. the capability approach by van der Klink et al. (2016)) as it is frequently used as a basis for other, mainly operational, conceptualizations of SE. Additionally, when discussing the other conceptualizations, we strive for completeness by also referencing non-internationally (i.e. Dutch) published definitions, if they underlie an internationally published conceptualization. Finally, we distinguish approaches to SE that aim to capture the construct itself from others that treat SE as an umbrella term.

The capability approach

The most widely cited and comprehensive conceptualization of SE stems from a Dutch paper by van der Klink et al. (2010) and was internationally published by van der Klink et al. (2016; p. 74):

“Sustainable employability means that throughout their working lives, workers can achieve tangible opportunities in the form of a set of capabilities. They also enjoy the necessary conditions that allow them to make a valuable contribution through their work, now and in the future, while safeguarding their health and welfare. This requires, on the one hand, a work context that facilitates this for them and on the other, the attitude and motivation to exploit these opportunities.”

This definition clearly considers SE as a multidimensional longitudinal construct, that is determined by- and relevant to both the employee and their employer. However, the definition also problematically combines antecedents and consequences of SE in the construct. Consequently, it is not clear which aspects constitute SE and at which level it should be analyzed (i.e. individual, work, and organizational components are included in the concept itself). In line with our aforementioned basic definition, it makes most sense to treat SE as an individual level characteristic, as it is the individual that is employed and, thus, has a certain ‘employability’. Additionally, a comprehensive conceptualization of SE should specify how its inherently longitudinal nature can be captured as well as apply to unemployed individuals (see Fleuren et al., 2016 for an indepth discussion).

The complicated nature of van der Klink et al.'s (2016) definition becomes particularly apparent when considering its accompanying operationalization by Abma et al. (2016). That is, Abma et al. (2016) provide an instrument that captures SE as a set of capabilities. Similar to the definition, these capabilities combine individual-level abilities and work characteristics in one. For example, the capability of knowledge and skills (which is one of the indicators of SE in this instrument) comprises of three items: "How important is it to you that you can use your knowledge and skills in your work?"; "Does your work offer enough opportunities to do that?"; and "To what extent do you succeed to actually do that?" (Abma et al., 2016). However, these items capture *opportunities* in the work-context (and how they are valued and used) rather than individual *abilities*. As such, capabilities as conceptualized by Abma et al. (2016) can be relevant, but are more likely to cover antecedent conditions rather than indicators of SE. That is, offering employees specific opportunities (i.e. capabilities) could improve their SE, but capabilities do not capture SE itself.

Importantly, capabilities relate to person-environment fit. Person-environment fit refers to the interaction between the individual characteristics and environmental characteristics (Kristof, 1996). In the context of work, fit can be defined at several levels (e.g. fit with the job, workgroup, organization, occupation etc. (Jansen & Kristof-Brown, 2006)) and specified in several ways (i.e. objective and subjective fit, supplementary and complementary fit (Edwards, Cable, Williamson, Schurer Lambert, & Shipp, 2006)). Particularly the complementary facets of person-job fit seem to match with capabilities. That is, the fit between a person and their job consists of whether the person has the required abilities to meet the job demands (i.e. demands-abilities fit) and whether the job supplies resources that meet the person's needs (i.e. needs-supplies fit) (Cable & DeRue, 2002). The central idea here is that a high person-job fit links to positive outcomes (i.e. performance, satisfaction etc.) (Kristof-Brown, Zimmerman, & Johnson, 2005). As capabilities cover aspects people value in work as well as to what extent they are provided and made use of, they closely resemble needs-supplies fit. In sum, person-environment fit in general, needs-supplies fit in particular, and capabilities, can all be conceived of as constituting antecedents – rather than indicators – of positive outcomes such as SE.

In conclusion, the capability approach offers interesting insights in potential antecedents and individual level indicators of SE. As argued, capabilities closely resemble person-environment fit and are feasible potential antecedents – but not

indicators – of SE. When treating capabilities and person-environment fit as such, research can actually identify which interacting employment characteristics (e.g. opportunities) predict SE. That way, no assumptions regarding what aspects people value at work and that such aspects indicate SE need to be made. Nonetheless, the other individual-level aspects van der Klink et al.'s (2011; 2016) mention in their definition (i.e. health, welfare, and motivation) could be relevant indicators of SE. Additionally, the longitudinal nature and multidimensionality in van der Klink et al.'s (2011; 2016) conceptualization of SE should be retained and developed further.

A constant match

Sanders, Dorenbosch, and Blonk (2015, p. 209) define SE as a “constant match between what a worker is able and willing to do and what the work demands and provides”. As such, SE could be seen as an enduring person-job fit over time. Notably and as discussed, the fit aspect matches the capability approach by van der Klink et al. (2011; 2016). Moreover, the notion of ‘constant’ includes the inherent temporal component of SE as well. Sanders et al. (2015) further develop their framework by discussing skills and motivation as aspects central to SE. They argue that employees need to maintain the skills and motivation to sustain their likelihood of employment. Finally, these authors propose three routes for developing SE: continuous life-long learning ('development route'), designing jobs to fit workers needs and abilities ('redesign route'), and moving jobs outside or within the organization ('mobility route').

Sanders et al. (2015) provide an approach that has several merits, but also some points for further improvement. First, they rightly recognize the necessity of skills as an important aspect in the context of SE. That is, given changes in the nature of work, employees need to remain sufficiently skilled to remain attractive on the labor market and, thus, employable (e.g. de Grip & van Loo, 2002). Although obvious, this notion is not explicated in most approaches to SE. Second, they explicate the time component of SE by referring to *constant* fit. Similar to our basic definition, this could enable capturing SE's time aspect by monitoring fit over time. As a third merit, the routes Sanders et al. (2015) discuss, could hint to potential employment conditions that may predict SE. Turning to points for development, however, person-job fit makes more sense as an antecedent condition of SE as argued previously. That is, if an individual has a good person-job fit one would expect their SE to be high as well, but this also depends on shifts in labor market demands. Moreover, although arguably implicitly, person-job fit does not explicitly include the health component.

As health is a crucial component of people's ability to remain working (Boschman, Hulshof, Frings-Dresen, & Sluiter, 2016; de Wind et al., 2014) and considering the absence of harm to stakeholders implied in sustainability (Finkbeiner et al., 2010), individuals' health should be explicitly included in SE. Furthermore, although quite broad, the person-job fit perspective is narrow in the sense that it considers a single job, but not the organization or potential jobs in the labor market. That is, when considering employability, not the fit for one job should be considered, but the broader likelihood of obtaining a (perhaps similar level) job. Finally, as argued previously, SE should be conceptualized as an individual characteristic (i.e. the individual is the unit that is employed and thus has a certain employability), whereas person-job fit (like capabilities) also includes contextual components.

The Ability-Motivation-Opportunity framework

A third, more operational, definition of SE relies on the Ability Motivation Opportunity framework (Le Blanc, van der Heijden, & van Vuuren, 2017). Building on a Dutch definition of SE as "the degree to which an employee is willing and able to carry out his/her current and future work" (van Vuuren, 2012; van Vuuren, Caniëls, & Semeijn, 2011), Le Blanc et al. (2017) operationalize SE based on motivation, ability and opportunity to continue working. The authors argue that to continue working, people need to be able, motivated, and have the opportunity to do so. A merit of this approach is that it incorporates the notion of SE as a multidimensional individual characteristic. Problematically, however, the approach of Le Blanc et al. (2017) does not explicitly address the longitudinal nature of SE. That is, although their single-item measures of ability and motivation make reference to the expected age until the individual can and wants to remain working, the study is cross-sectional. Additionally, the notion of opportunity, although operationalized in this study as perceived employability, should be considered an antecedent rather than part of SE itself (as argued previously). Finally, it seems advisable to complement the measures used with more direct measures of health, well-being and competences to enable specific monitoring of the ability components of SE. Nonetheless, the idea of capturing individual level aspects of motivation and ability should be incorporated in future approaches to SE.

The vitality scan

Building on van der Klink et al.'s (2016) definition of SE, Brouwers, Engels, Heerkens, and van der Beek (2015) provide a vitality scan. In this scan, SE is operationalized with five dimensions: balance and competence, motivation and involvement,

resilience, mental and physical health, and social support at work. Notably, the dimensions motivation (and involvement), and mental and physical health agree with the aforementioned conceptualizations, but balance, involvement, resilience, and social support are novel. Although these first three dimensions seem to make perfect sense (i.e. based on agreement with previous work), the other factors seem to lack clear definitions and rationales. That is, the vitality scan is constructed based on principal components analyses and Cronbach's alphas, causing some of the dimensions to be defined *post-hoc*, without inclusion of any confirmatory analyses. Additionally, the low factor loadings and the variety in item content suggest that formative measurement models (for which factor analyses and Cronbach's alphas are meaningless (Fleuren, van Amelsvoort, Zijlstra, de Grip, & Kant, 2018)) are more appropriate. Moreover, balance, resilience, and social support are more likely to be antecedents than indicators of SE. That is, balance refers to an interaction between the individual and work; resilience refers to an individual's ability to cope with/ adapt to change; and social support is by definition a contextual predictor. Although these factors can contribute to SE, they do not seem to indicate it unambiguously. Finally, the longitudinal component of SE is not specified. In conclusion, the vitality scan seems to include useful elements (i.e. the individual level indicators of health, competence and motivation), but does not capture SE comprehensively.

A multivariate approach

Also following van der Klink et al.'s definition, Peters, Engels, de Rijk, and Nijhuis (2015) use a broad set of indicators to capture SE. Specifically, they include general health, general fatigue, emotional exhaustion, work ability, work engagement, work-home interference, job satisfaction, and sickness absence. As such, this conceptualization also considers SE as a multidimensional individual characteristic. Moreover, in line with the basic definition of SE provided in the present paper, most aspects are indicative of an individual's ability to function at work and on the labor market. However, sickness absence is a behavior rather than ability, and work-home interference consists of both individual and contextual factors. These two variables are undoubtedly relevant in the context of SE, but work-home interference seems a predictor (rather than indicator) and sickness absence can be both a predictor (i.e. not coming to work to avoid long term disability) and an outcome (i.e. a low ability to function in work would predict sickness absence). Nonetheless, the other aspects could prove useful indicators of SE. Importantly, however, the longitudinal aspect of SE is again not specified.

Prolonged working life in good health and productivity

Ybema et al. (2014) use a unique operational definition of SE. That is, they define SE as “prolonging working life in good health, while maintaining good work productivity” (Ybema et al., 2014, p. 1384). In the design of their longitudinal study, they further operationalize SE by considering transitions in employment status (e.g. the transition from employment to retirement or unemployment) and how productive individuals are in their paid job. The notion of productivity as an indicator of an individual’s SE does make sense. That is, if employees cannot be productive, they are not attractive to employers. However, productivity is a complicated construct, particularly considering that for many current (e.g. service-based) jobs productivity is difficult to measure. In that sense, performance (i.e. employees need to be able to perform well at work to be attractive to employers) could be a more convenient concept. Similarly, although transitions can be relevant, they cannot serve as unambiguous indicators of SE. That is, an individual’s employment status may change without any concurrent change in that individual’s SE (e.g. voluntary time-specific job loss). As such, this operationalization may result in an interesting study in itself, but it does not provide straightforward indicators of SE.

Expertise, willingness to change and beliefs

Another conceptualization that deliberately avoids the longitudinal perspective of SE is provided by van Harten (2016). In her dissertation SE is defined as “an employee’s up-to-date expertise and willingness to change – i.e. current employability – and [their] beliefs regarding employment opportunities.” (van Harten, 2016, p. 35). The value of this definition can lie in that it reiterates the relevance of competences (i.e. expertise) as well as general employability. However, the fact that this definition discounts the longitudinal aspect of employability leaves room for improvement.

Straightforward singular measures

Some studies do not really define SE, but operationalize it using relatively simple measures. A first example is van Scheppingen et al. (2015, p. 49) who assess SE with a single item “Taken into consideration your health, do you expect that you are still able to do this work the following 5–10 years?”. Similarly, Oude Hengel (2013) operationalizes SE throughout her dissertation as perceived ability and willingness to remain working until the official retirement age, but also proposes to use work ability and health status as important outcome indicators. Additionally, Noben, Nijhuis, de Rijk, and Evers (2012) operationalize SE as post-intervention

absenteeism. These singular measures undoubtedly constitute relevant aspects, but do not (aim to) provide a comprehensive account of SE.

Under the SE umbrella

Finally, some research refers to SE in another meaning than intended here or simply as an overarching concept and/or without aiming to define and measure it. First, Watts (2006) discusses SE in the context of education programs, arguing that SE should capture not only students' ability to obtain their first job, but to be attractive to employers on the long term. Second, some studies are positioned under the umbrella of SE, but do not actually aim to measure and predict the construct itself. An example is the study by (Smaliukienė, 2014) that considers international variations in retirement policies within the police force and military. Similarly, Tonnon et al. (2017) explore the employer's perspective on SE of construction workers. Additionally, Ybema, van Vuuren, and van Dam (2017) investigate HR practices aimed at promoting SE. These studies consider contextual factors that are relevant to SE, but they do not target the construct itself. Third, some studies do also not aim to capture the construct itself, but – usually convincingly – argue that their findings can be positioned in the SE framework (for good examples, see Leijten, van den Heuvel, Ybema, Robroek, & Burdorf, 2013; Rongen, Robroek, Schaufeli, & Burdorf, 2014; van der Heijden, Gorgievski, & de Lange, 2015; van Holland, De Boer, Brouwer, Soer, & Reneman, 2012). The (types of) studies mentioned in this paragraph clearly have their value, but they do not seem directly relevant for achieving a comprehensive conceptualization of SE. Therefore, they are not taken into further consideration throughout the present paper.

Conclusions regarding existing SE conceptualizations

By considering these several conceptualizations of SE, five general conclusions can be drawn. First, most conceptualizations are cross-sectional and those that include a longitudinal component do not clearly specify how it should be captured. Our presented basic definition has the potential to address this issue. Second, most conceptualizations of SE revolve around individual-level indicators. This is clearly desirable as the individual is the unit that can or cannot be employed and thus SE is an individual characteristic. As such, conceptualizations that do include context-level indicators should position them as antecedents (in the employment context) rather than indicators. Third, SE is typically conceptualized as a multidimensional construct. This also seems adequate as SE should capture an individual's ability to function at work and on the labor market and is thus a complex multifaceted construct. As

such, approaches with singular indicators should likely be expanded. Fourth, most conceptualizations share similar individual-level indicators, such as health, skills/competences, perceived employability, motivation/engagement/satisfaction, work ability, and performance/productivity. As these indicators capture distinct aspects of the ability to function at work and in the labor market, they could be relevant indicators to enrich our basic definition of SE. Finally, in line with the notion of SE as outcome of employment, these individual-level indicators can also be considered as outcomes of (or at least affected by) employment. In the following paragraphs we use these general conclusions to further develop our basic definition of SE.

Proposition 2

A comprehensive conceptualization of SE should, based on the basic definition provided in the present paper and existing conceptualizations, ...

- a) *Explicitly include the temporal component of SE.*
- b) *Consider SE as an individual characteristic and, thus, not include contextual components in its conceptualization.*
- c) *Cover functioning at work and in the labor market as a multidimensional construct*
- d) *Include indicators in the health (e.g. subjective health and work ability), well-being (e.g. motivation and satisfaction), and employability (e.g. perceived employability, performance, and competences) domains.*
- e) *Include indicators that can be considered to be outcomes of employment*

Towards a comprehensive definition of SE

So far, we have established a basic definition of SE as when the ‘employability’ of an individual is not affected negatively (and preferably positively) affected by the way in which an individual is employed over time. ‘Employability’ here should then correspond to an individual’s ability to function at work but also in the labor market. Further, we have proposed that if this ‘employability’ can be captured at multiple time points, its ‘sustainability’ can also be captured by considering ‘employability’s’ development over time. This development could then be linked to several aspects of an employment situation to identify the antecedents of SE that comprise sustainable employment. We now first turn to what exactly constitutes ‘employability’ in the context of SE. Second, we consider ways of capturing ‘employability’s’ sustainability as development over time. Third, a complete definition of SE is presented by synthesizing these two elements.

What is ‘employability’ in the context of SE?

As touched on previously, several conceptualizations of employability exist in the literature. First, Fugate et al. (2004) provide a dispositional approach in which employability consists of a set of personality characteristics that facilitate obtaining and maintaining employment. Second, other authors use a competence based approach where employability consists of a set of skills that facilitate obtaining and maintaining employment (e.g. Hillage & Pollard, 1998; van der Heijde & van der Heijden, 2006). Third, employability could be conceptualized as the chance of obtaining a job in the internal or external labor market (Forrier & Sels, 2003). Fourth, some authors have proposed to, when capturing this chance of employment, account for the labor market demand for (types of (cf. Bowman, McGann, Kimberly, & Biggs, 2016)) employees within a specific sector (de Grip et al., 2004). Fifth, other authors propose using perceived employability to capture an individual’s perceptions given their skills and the state of the labor market at a given time (e.g. Forrier, Verbruggen, & de Cuyper, 2015; Vanhercke, de Cuyper, Peeters, & de Witte, 2014). Although these approaches differ slightly, employability does seem to boil down to an individual’s labor market chances, be it in terms of human capital (i.e. knowledge, skills, abilities and other relevant characteristics), the skill to market it to potential employers, or the predisposition to do so (for comprehensive discussions, see Clarke, 2008; Forrier et al., 2015). This certainly seems to match part of what SE should capture, but is it sufficient?

Despite their relevance, the aforementioned existing approaches to employability are insufficient to capture SE. That is, although proposed by some authors as antecedents of employability (e.g. McQuaid & Lindsay, 2005), health and well-being are not included any of the approaches. However, as SE should capture the ability to function at work and in the labor market *on the long term*, these components should ideally be included. After all, one of the main reasons for people to stop working/retire early are health, motivation (Feldman, 1994; Shultz, Morton, & Weckerle, 1998), and negative job attitudes (Thorsen, Jensen, & Bjørner, 2016; van Dam, van der Vorst, & van der Heijden, 2009). Therefore, in line with the previously discussed conceptualizations of SE, the added value for stakeholders aspect of sustainability (Finkbeiner et al., 2010; Newman, 2005), as well as the ICF framework for functioning (van der Klink et al., 2016), these aspects seem essential. However, this begs the question which components should be included in a comprehensive conceptualization of SE, besides employability, health and well-being.

Selecting SE's indicators

Based on our basic conceptualization of SE so far, five criteria for indicators can be derived. First, each indicator should capture (an aspect of) an individual's ability to function at work and in the labor market. That is, they need to match the broad 'employability' aspect of SE as discussed. Second, as SE is an individual level construct, indicators should be on the individual level as well. Third, as SE is an outcome of the way in which individuals are employed, each indicator should be an outcome of- or affected by aspects of employment characteristics. Fourth, each indicator should be related to what would theoretically be outcomes of SE. As such, they should relate to long-term employment, early labor market withdrawal, and absenteeism, as one would typically expect sustainably employable employees to actually work. And fifth, indicators should not overlap conceptually to achieve a comprehensive but parsimonious conceptualization.

Following existing conceptualizations of SE and the aforementioned criteria, a set of eight distinct indicators can be identified, spanning the domains of health, well-being, and employability. That is, in the *health* domain work ability, (subjective) health, and fatigue fit the criteria; in the *well-being* domain motivation to work and job satisfaction fit the criteria; and in the *employability* domain employability, competences and performance all fit the criteria. Below we discuss each of these indicators briefly and we provide an overview of their relevance for SE in Table 3.1. Moreover, we argue that perceived employability is the most adequate type of employability to include, fatigue should be considered as short-term (i.e. need for recovery) and long-term fatigue (i.e. prolonged fatigue or exhaustion), and competences are here best captured as skill-gap. As such, we propose a total of *nine indicators* that can comprehensively capture SE.

Health domain

An individual's health is a relevant indicator for functioning at work (Boschman et al., 2016; Danna & Griffin, 1999), predicts absenteeism (Bielecky et al., 2015; Darr & Johns, 2008), labor market withdrawal, and can be an outcome of employment (de Wind et al., 2014; Mänty et al., 2015). Therefore health in general makes for an obvious candidate as component of SE. However, rather than considering objective health status (e.g. by considering absence of diseases, disorders, or disabilities), subjective health (e.g. how healthy does someone feel given any potential complaints) seems most appropriate as indicator of SE. That is, diseases, disorders, and disabilities may affect the functioning of individuals to different extents, are

more at the extreme end of the health continuum, show little variance over time, and their prevalence may be misrepresented in the working population due to early drop-out. Additionally, diseases, disorders and disabilities are not necessarily outcomes of employment (e.g. lung cancer may be an outcome of poor working conditions (e.g. asbestos) but may as well be caused by smoking). Therefore, when considering health indicators for SE, subjective health indicators are most feasible.

Based on the aforementioned considerations and existing conceptualizations of SE, three complementary subjective health indicators can be perceived health status, work ability, and fatigue. First, perceived health status captures how healthy individual perceive themselves to be (Hunt et al., 1980). This makes for a good indicator of SE as in an ideal employment situation, an individual's health perceptions are not negatively affected their employment, so they can remain sufficiently healthy to work on the long term (e.g. Montano, 2016). Second, work ability is used in multiple conceptualizations of SE and essentially captures how able an individual is to perform their job given their physical and mental health (Ilmarinen & Tuomi, 2004; Ilmarinen, Tuomi, & Seitsamo, 2005). Although work ability is related to some of the other indicators we propose (e.g. skills are considered one of its antecedents), work ability is clearly health based and it does not explicitly include these other indicators (cf. Gould, Ilmarinen, Järvisalo, & Koskinen, 2008). Third, fatigue is characterized by physiological responses and disturbances of mood as a result of the mental and/or physical resources of an individual being depleted due to effort expenditure (Meijman & Schaufeli, 1996). As such, it captures the accumulated general effects of working on an individual over time and affects how well an individual can concentrate and is motivated to engage in activities such as work. Fatigue's relevance as indicator of SE therefore seems obvious (e.g. Janssen, Kant, Swaen, Janssen, & Schroer, 2003). However, to cover the complete fatigue continuum (Mohren, Jansen, van Amelsvoort, & Kant, 2007) it seems instrumental to distinguish between short-term need for recovery and prolonged fatigue (Meijman, 1989 ; Sluiter, Frings-Dresen, van der Beek, & Meijman, 2001). Detailed descriptions of these four health-based indicators and their suitability for SE are provided in Table 3.1.

Well-being domain

Well-being encompasses the psychological component of functioning at work. From the aforementioned conceptualizations of SE two indicators seem particularly relevant in this domain: Motivation (to work) and job satisfaction (see Table 3.1).

Table 3.1. Overview of proposed dimensions of sustainable employability (SE) and reasons for inclusion

| Dimension | Description | Unique contribution |
|-------------------------|--|--|
| Perceived health status | Individual's current health perception (Hunt et al., 1980). Describes how healthy an individual feels, regardless of the presence of diseases. Includes subjective health complaints and complaints associated with disease (Lind et al., 2005). Can be an outcome of employment (e.g. Montano, 2016). The relevance of perceived health status as indicator of functioning in work is well-established (Boschman et al., 2016; Danna & Griffin, 1999; Eriksen, Ihlebaek, & Ursin, 1999; Tellnes & Bjerkedal, 1989). | Captures health in a general sense |
| Work ability | Individual's ability to (function in) work, given that individual's health status and the job demands that individual faces (Ilmarinen & Tuomi, 2004; Ilmarinen et al., 2005). Indicative of functioning in work (von Bonsdorff et al., 2011) and an outcome of employment (Palermo, Fuller-Tyszkiewics, Walker, & Appannah, 2013). Predicts absenteeism (Kujala et al., 2006; Nygård et al., 2005; Schouten et al., 2015), unemployment (Alavinia, de Boer, van Duivenbooden, Frings-Dresen, & Burdorf, 2009), and early retirement (de Wind, Geuskens, Ybema, Bongers, & van der Beek, 2015). | Captures a general ability to work |
| Fatigue | Occurs when an individual systematically fails to recuperate over a longer period of time. Characterized by lower efficiency, negative emotions, reduced interest involvement and commitment, and lower levels of motivation and concentration (Meijman & Schaufeli, 1996). Associated with absenteeism, work disability (Janssen et al., 2003), performance (Samkoff & Jacques, 1991), and turnover (Knudsen, Ducharme, & Roman, 2009). Outcome of working/employment (Dohrmann & Leppin, 2017; Vignoli, Guglielmi, Bonfiglioli, & Violante, 2016). | Captures severe fatigue |
| Need for recovery | Individual's ability to recuperate from work-induced fatigue (Meijman, 1989 ; Sluiter et al., 2001). Captures acute fatigue as a state. Characterized by physiological responses and disturbances of mood as a result of the mental and/or physical resources of an individual being depleted due to effort expenditure (Meijman, 1991). Related to functioning (Zijlstra, Cropley, & Rydstedt, 2014) and predicts absenteeism (de Croon, Sluiter, & Frings-Dresen, 2003) as well as turnover (de Croon, Sluiter, Blonk, Broersen, & Frings-Dresen, 2004). By definition and empirical evidence an outcome of working (Gommans, Jansen, Stynen, de Grijp, & Kant, 2015; Mohren, Jansen, & Kant, 2010). | Captures mild fatigue (Jansen, Kant, & van den Brandt, 2002). |

Table 1 continued

| <i>Dimension</i> | <i>Description</i> | <i>Unique contribution</i> |
|--------------------------------|--|---|
| Job satisfaction | Degree to which an individual is satisfied about their job (Spector, 1997). Indicator of well-being (de Jonge & Schaufeli, 1998). Positively associated with functioning (Harter et al., 2002; Latham, 2012). Negatively associated with turnover (Harter et al., 2002) and absenteeism (Duijts, Kant, Swaen, van den Brandt, & Zeegers, 2007). By definition and empirical evidence an outcome of employment (Nijp et al., 2012). | Captures job-related well-being |
| Motivation to work (intensity) | Driving force that elicits goal-directed behavior (Latham, 2012). The intensity of motivation reflects how strongly an individual is driven to engage specific behavior (Gagné & Deci, 2005; Ryan & Deci, 2000). Outcome of working (Houkes et al., 2003) and linked to absenteeism and employee turnover (Battistelli et al., 2013). | Captures willingness to work |
| Perceived employability | Individual's labor market chances based on their human capital and their capacity to market it to employers (Fugate et al., 2004; Hillage & Pollard, 1998; Sanders & de Grip, 2004). Indicates functioning in the labor market and affected by current employment (Groot & Maassen van den Brink, 2000), and affected by labor market conditions (de Grip et al., 2004). | Captures functioning in the labor market |
| Skill-gap | Match between an individual's skills and the job's skill requirements (Allen & de Grip, 2012; de Wind et al., 2014). Skill-gap is indicative of functioning and can be an outcome of employment (de Grip & van Looy, 2002). | Captures the competence aspect |
| Job performance | Captures how well an individual succeeds in completing the tasks that are part of his/her job. Directly provides an indication of an individual's ability to function in work as materialized in performance. Outcome of the way in which an individual is employed, negatively associated with job loss and premature labor market withdrawal (Besen & Pransky, 2014). | Captures materialized functioning in work |

Job satisfaction encompasses the attitudinal component of SE and captures how satisfied an individual is with their job (e.g. Harter, Schmidt, & Hayes, 2002; Spector, 1997). This is relevant to SE as satisfied employees are more likely to be willing and able to function at work, and low satisfaction could indicate non-sustainable employment conditions (Nijp, Beckers, Geurts, Tucker, & Kompier, 2012). Similarly, motivation captures the willingness to work component (Gagné & Deci, 2005; Mitchell & Daniels, 2003; Ryan & Deci, 2000) that is indispensable for SE. That is, if people do not want to work, they are less likely to sustain their long-term labor participation (cf. Battistelli, Galletta, Portoghesi, & Vandenberghe, 2013). Additionally, as motivation results from the quality of an individual's need fulfillment at work (cf. person-job fit), it qualifies as an employment outcome (Houkes, Janssen, Jonge, & Bakker, 2003).

Employability domain

With regard to the employability domain three indicators appear in the existing approaches to SE that relate both to functioning and attractiveness to employers. First, the aforementioned general concept of employability seems to be a relevant indicator. Specifically perceived employability seems suitable, as it consists of the perceptions of both internal (i.e. in the current organization) and external (i.e. other organizations) labor market chances (Vanhercke et al., 2014). Perceived employability can therefore cover the labor market functioning aspect of SE. Second, an individual's competences should be included in some form as indicator of SE. As no general competence set that captures the ability to function in all types of jobs can be identified, it is arguably most instrumental to consider the competences an individual needs to have for their current job and those that an individual actually has. Therefore, we propose that skill-gap could be a convenient indicator to capture the competence aspect of SE (de Grip & van Loo, 2002). Finally, to be sustainably employable, an individual needs to be able to function productively and perform adequately at work (Besen & Pransky, 2014). As such, we propose that a comprehensive approach to SE should include job performance as indicator as well. Table 3.1 elaborates on these three indicators of SE.

In conclusion, we propose that the 'employability' as an individual's ability to function at work and in the labor market component of SE can be captured with nine indicators. These nine indicators are perceived health status, work ability, need for recovery, fatigue, job satisfaction, motivation to work, perceived employability, skill-gap, and job performance.

Capturing the sustainability component of SE

As the aforementioned nine indicators allow the ‘employability’ component to be captured, the ‘sustainability’ component of SE can be captured as well. As proposed, ‘employability’ can be considered sustainable if it does not decline – and preferably improves – over time. This suggests that if ‘employability’ has a positive or zero, but not a negative, developmental trajectory across multiple time points, it is sustainable over that specific period of time. Capturing development is essentially an issue of capturing change over time. As such, several techniques may be suitable, but we propose using latent growth curve modelling (LGCM) (Duncan, Duncan, & Strycker, 2006) to capture ‘employability’s’ developmental trajectory. In LGCM the intercept and slope of the ‘employability’ variable can be modeled as ‘latent’ variables that can be related to predictor- and/or outcome variables. The slope in an LGCM represents the linear (or quadratic or cubic to model non-linear growth) development over time, whereas the intercept represents the starting value of the variable (e.g. ‘employability’) at the first time point included. Then, relating potential predictors to the slope of ‘employability’ allows estimating their effects on the ‘sustainability of employability’, or rather, sustainable employability (SE). Thereby, the factors that promote SE can be identified, as is the goal of SE research.

The full definition of SE

With all components (i.e. a basic definition, indicators, and the sustainability aspect) covered, we can now formulate a complete definition of SE that integrates previous conceptualizations, follows suggestions for improvement, and provides clear opportunities for operationalization and measurement of all components concerned:

Sustainable employability means that an individual’s ability to function at work and in the labor market, or their ‘employability’, is not negatively, and preferably positively, affected by that individual’s employment over time. This ability can be captured meaningfully as a combination of nine indicators (i.e. perceived health status, work ability, need for recovery, fatigue, job satisfaction, motivation to work, perceived employability, skill-gap, and job performance) that collectively describe how well an individual can be employed at different points throughout the working life.

Figure 3.1 depicts the corresponding conceptual model and framework for SE. As shown in the model, SE is represented by the central oval which is the slope of ‘employability’ over three time points. Moreover, ‘employability’ is captured as a

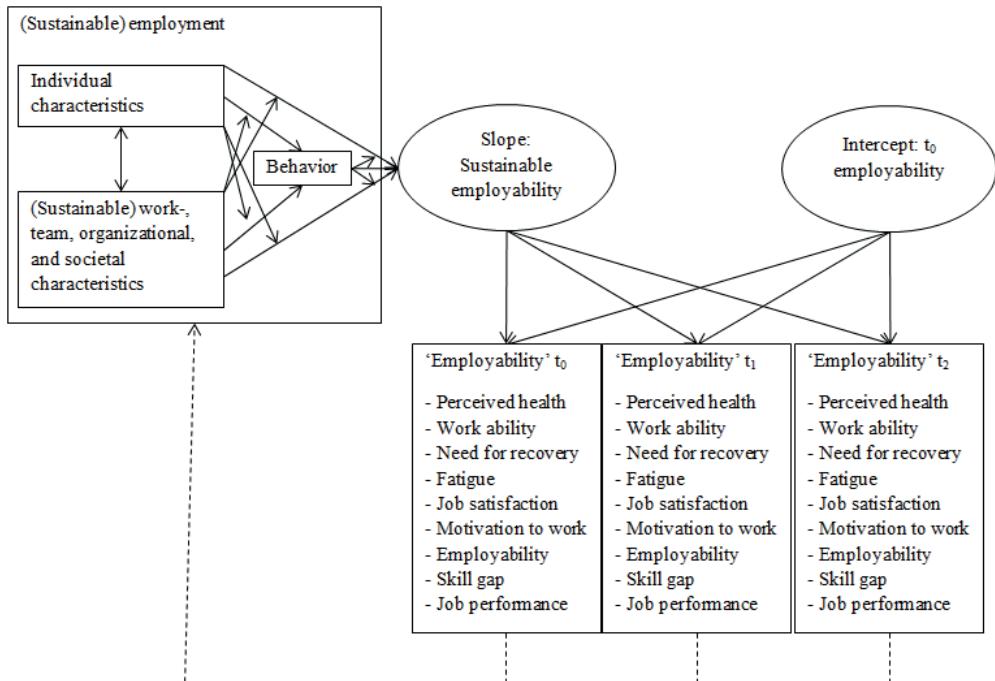


Figure 3.1. Complete conceptual model of sustainable employability and sustainable employment. The depicted model represents a latent growth curve model. In this model the ‘employability’ component of sustainable employability is captured as a construct consisting of nine indicators. This construct is then measured at multiple time points (here three), allowing a slope to be computed to capture the ‘sustainability’ component of sustainable employability. This slope in turn can be modeled as predicted by various interaction employment characteristics, enabling the identification of sustainable employability’s predictors that together constitute sustainable employment.

combination of the nine indicators at each time point (i.e. the rectangular shapes in the middle to right parts of the model). Additionally, the right oval represents the intercept, capturing the starting value of SE at t_0 . Finally, the left side of the model also includes sustainable employment as conceptualized in the next, penultimate, part of this paper.

Sustainable employment, sustainable work, and sustainable work ability

With a clear definition and operationalization of SE, we now turn to other closely related concepts of sustainable employment, -work, and -work ability. This is instrumental as these topics can be integrated into the conceptual model for SE. Moreover, it provides clarity in the literature on how these terms should be used and what they can mean.

Conceptualizing sustainable employment

As briefly mentioned previously, a definition of sustainable employment can be derived from our definition of SE. That is, sustainable employment exists when aspects of employment do not negatively affect an individual's SE over time. Consequently, employment can be referred to as sustainable by considering how aspects of an employment situation affect SE. Importantly, this definition implies that a meaningful conceptualization of (sustainable) employment should entail more than simply employment status over a specific period of time (which McCollum (2012) already referred to as an "at best unambitious" (p. 216) conceptualization of sustainable employment). That is, an individual's employment status is clearly relevant for SE as the unemployed typically have lower health, well-being, and fewer opportunities to maintain competences (de Grip & van Loo, 2002; Schuring, Robroek, Lingsma, & Burdorf, 2015; Secker & Membrey, 2003). However, to identify employment characteristics that are antecedents of SE – and that could thus comprise sustainable employment – employment should be conceptualized such that several individual-, work-, and work-contextual factors are considered. Consequently, sustainable employment should not only cover *whether*, but mainly *how* an individual is employed over a certain period of time.

Employment characteristics can be identified at the individual-, work-, and work-contextual levels and include an individual's behavior. First, individuals within an employment situation have certain characteristics that form the starting position of an individual's employment (e.g. preferences, personality, gender, ethnicity, age (cf. Timming, 2016)). Second, being employed, individuals perform tasks that can be described in terms of several work characteristics (e.g. job demands and resources). Third, individuals work in a certain environment (i.e. within a team, department, and organization, within the labor market/society (Renkema, Meijerink, & Bondarouk, 2017)), that can also be described in terms of several work contextual

characteristics (e.g. inclusiveness (Shore, Cleveland, & Sanchez, 2018)). Finally, without individuals interacting with the aforementioned employment characteristics in certain ways, nothing would happen. As such, the behavior of the individual in their employment context needs to be considered as well. In sum, individual, work, and work-contextual characteristics, but also behaviors comprise an employment situation. Figure 3.1 synthesizes this notion of employment characteristics as interacting antecedents of SE. Sustainable in reference to employment is in brackets to represent that employment's sustainability depends on SE.

An example describing how each type of employment characteristic may relate to SE could revolve around learning at work. Consider an individual who is motivated to learn (individual characteristic), in a job that features many opportunities to learn (job/work characteristic), but an organizational climate that discourages learning (organizational characteristic). The individual, given the organizational climate, decides to not seize the opportunities (behavior) and learns less. However, given the labor market demand for highly skilled employees (societal characteristic), this has negative implications on that individual's SE (outcome). This example illustrates how SE can conceptually be predicted by interactions between individual-, work-, and work-contextual characteristics and behavior that comprise the employment context. In this example, the individual is not sustainably employed, due to the organizational climate and their climate-congruent behavior. Moreover, this example demonstrates that opportunities are predictors (rather than indicators) of SE, as the extent to which they are utilized determines the individual's SE. This echoes the notion that person-environment fit and capabilities should be considered as situations in which employment characteristics interact in a way that likely positively contributes to SE. However, research still needs to establish this empirically.

Rather than a one-directional relationship, SE and sustainable employment likely have a reciprocal relationship. That is, as depicted by the dashed line in Figure 3.1, 'employability' at a certain point in time, can arguably determine employment characteristics at a later point in time. For example, if an individual does not have a sustainable employability, a change in employment characteristics (e.g. lower demands, other job, or a change in employment status) becomes increasingly likely over time. Such changes may be involuntary (e.g. job loss), but could also be deliberate. That is, when an individual notices that because of a suboptimal person-job fit (i.e. a combination of interacting individual- and job characteristics in the

employment situation), their SE undergoes a negative development, they may engage in job crafting or job carving to restore the person-job fit and consequently sustain their employability over time (cf. Kira et al., 2010).

Conceptualizing sustainable employment as *the* (set of) antecedent(s) of SE has at least six important advantages. First, this conceptualization explicitly separates aspects of (sustainable) employment that could lead to SE and SE itself. Thereby, it actually allows for the identification of the factors in the employment situation that harm or contribute to SE and no assumptions have to be made in this respect. However – and this is the second advantage – by positioning SE as an outcome of (sustainable) employment, employers also explicitly share the responsibility for their employees' SE like in van der Klink et al.'s (2016) definition. As the third advantage, this conceptualization explicitly positions SE as an individual-level characteristic. Recognizing SE as such is crucial, as the individual is the unit that is employed, that has a certain ability to be employed, and, therefore, should be the level of analysis. Fourth, this conceptualization is applicable to unemployed individuals as employment status can be positioned as one of the employment characteristics. Fifth, the proposed conceptualization provides the necessary conceptual clarity with regard to how SE and sustainable employment are different, reducing the chance of conceptual inconsistencies. For example, van Dam et al. (2017) define sustainable employment as "the extent to which workers are able and willing to remain working now and in the future" (p. 2451). However, this more closely resembles typical definitions of SE rather than sustainable employment. Sixth, unlike conceptualizations of sustainable employment that center exclusively on employment status, our conceptualization actually enables the identification of the aspects of employment that determine its sustainability. For example, Kellard, Walker, Ashworth, Howard, and Liu (2001) define sustainable employment as "the maintenance of a stable or upward employment trajectory in the longer term" (p. 49). Although this conceptualization certainly captures part of it, it offers limited opportunities to identify which aspects of employment make it sustainable.

Proposition 3

Sustainable employment describes a situation in which an individual is employed in such a way that their SE is not negatively affected over time, where...

- a) *The way in which an individual is employed can be described in terms of that individual's employment status as well as several employment characteristics*
- b) *Employment characteristics can be identified at several levels including the individual's*

characteristics and behavior; the job and the tasks it consists of; the team or other organizational units; the organization and work environment; and the societal context.

- c) *Employment characteristics can interact in several ways, potentially relating to each other as covariates (i.e. conjointly predicting SE), mediators (i.e. one characteristic's effect on SE is (partially) explained by another characteristic), and/or moderators (i.e. one characteristic's effect on SE depends on another characteristic).*
- d) *Person-environment fit and capabilities may constitute particularly beneficial interactions between employment characteristics.*
- e) *Employers and employees share the responsibility for shaping employment characteristics in such a way that they promote SE (e.g. through job design).*
- f) *Employment characteristics are likely partially determined by previous SE, leading to a reciprocal relationship between SE and sustainable employment over time.*

Sustainable work and –work ability

Besides a meaningful conceptualization of sustainable employment, our conceptual framework for SE offers an opportunity to clarify the concepts of *sustainable work* and *sustainable work ability* as well. These concepts are similar and closely related to the concepts of sustainable employment and SE, but are not entirely synonymous. In the following paragraphs we argue that both concepts can be understood as elements that can be positioned in the framework for SE, thus integrating the sustainable work(ability) and SE literature.

Kira et al. (2010) define sustainable work as “[work that …] promotes the development in employees’ personal resources underlying their sustainable abilities to work” (p. 617). Similarly, Eurofound (2015) suggests that “sustainable work over the life course’ means that working and living conditions are such that they support people in engaging and remaining in work throughout an extended working life. These conditions enable a fit between work and the characteristics or circumstances of the individual throughout their changing life, and must be developed through policies and practices at work and outside of work” (p. 2). Additionally, Kira et al. (2010) define sustainable work ability as “the ability to keep on working, to experience work as a positive factor in life, and to keep on making positive contributions in the lives of colleagues, customers, and other stakeholders” (p. 627-628). This somewhat matches the ‘regular’ concept of work ability as discussed previously (Gould et al., 2008).

Three clear similarities between these definitions of sustainable work and –work ability and our framework for sustainable employment and –employability can be identified. First, both pairs of concepts of sustainable work and –work ability and sustainable employment and –employability intend to facilitate prolonged participation in work. As such, both pairs inherently propose a longitudinal perspective towards the functioning of employees at work (and, pertaining to the employment-employability pair, the labor market). Second, Kira et al. (2010) clearly position sustainable work as antecedent conditions of –work ability. This predictor-outcome relationship is exactly as we propose it for sustainable employment and –employability. Third, Kira et al. (2010) argue that through collaborative work design, work can be shaped in such a way that work ability is sustained. This matches the shared responsibility employers and employees have in designing employment so that it sustains employability. Considering these three similarities, SE research may benefit from ideas on designing sustainable work as for example discussed by (Kira et al., 2010).

Important differences between sustainable work and –work ability and sustainable employment and –employability exist as well. The first difference is that sustainable work and –work ability are slightly more narrowly defined than sustainable employment and –employability. That is, the sustainable work concepts are focused on work, which is part of- but does not completely cover the conceptual bandwidth that employment is to cover. That is, sustainable employment and –employability include the notion of labor market characteristics, which are essential to account for when aiming to foster participation in work (see de Grip et al., 2004). Additionally, the employment conceptualization as proposed also includes individual and organizational characteristics as input variables. As such, sustainable work may be part of sustainable employment and sustainable work ability can be considered an aspect of SE. In fact, previous work on SE includes work ability as one of the key-indicators (e.g. Koolhaas, 2014; Oude Hengel, 2013; Peters et al., 2015). Second, no clear measures for sustainable work and -work ability exist and it is unclear how the time-factor should be operationalized to truly capture the sustainability aspect. Of course the work ability index could arguably be used over time to capture sustainable work ability, but the literature has yet to propose this. Similarly, no clear indicators for sustainable work have been proposed yet, but it probably could follow the same structure as sustainable employment in our framework. That is, sustainable work could be inferred from sustainable work ability over time. Again, sustainable work and –work ability can clearly be positioned in the proposed framework and this arguably helps further their operationalizations.

In conclusion it seems that sustainable work and –work ability can be placed within the sustainable employment and –employability framework. Figure 3.1 aims to depict this by including “(Sustainable) work” as part of the conceptualization of employment. Similarly, work ability is included as one of SE’s indicators. Hereby, the two separate strands of literature can be integrated and mutually beneficial lessons can be exchanged. Moreover, the similarities between the two approaches towards sustainability provide some confidence regarding their validity and viability.

Proposition 4

Sustainable work and sustainable work ability can be positioned in the framework of SE in such a way that ...

- a) *Sustainable work covers one aspect of sustainable employment, namely that work characteristics are shaped in such a way that they are associated with sustainable work ability and SE.*
- b) *Sustainable work ability covers one aspect of SE, namely stability or growth in the work ability indicator of SE.*

Discussion

By reviewing and integrating the existing conceptualizations of sustainable employability (SE) the present paper provides comprehensive definitions and a conceptual framework for SE and sustainable employment. The resulting framework also integrates sustainable work and sustainable work ability by Kira et al. (2010), clarifying the connection of these concepts with SE. The presented approach, conceptualizes SE as a longitudinal multidimensional individual-level construct that is predicted by characteristics of (sustainable) employment. Additionally, sustainable employment is conceptualized as interacting individual, work, and work-contextual characteristics that contribute to SE. As such, sustainable employment therefore resembles capabilities (Abma et al., 2016; van der Klink et al., 2016) and person-environment fit (e.g. Kristof-Brown et al., 2005; Sanders et al., 2015) which are now identified as potential antecedents – rather than indicators – of SE. Consequently, the framework separates cause and effect, makes SE measurable, provides a clear reference point for research on SE and sustainable employment, and, as argued, meets all requirements for a comprehensive conceptualization of SE as proposed by Fleuren et al. (2016). For practitioners and policy makers the presented conceptual framework implies that long-term multifaceted approaches are necessary to monitor

and improve SE. For researchers the road towards meaningful research on SE now seems a little less bumpy.

Implications for research

By conceptualizing SE as an inherently longitudinal construct, the first major implication for research is that studies on SE need to be longitudinal. As sustainability can only be captured in longitudinal research, cross-sectional studies cannot address SE. Consequently, we propose that studies on SE follow individuals over time and use analytical techniques such as latent growth curve modeling and other approaches that capture change over time and can relate it to employment characteristics. For example, researchers with two-wave data could compute difference scores to capture SE as change from one time point to the next. Relatedly, the proposed conceptualization allows for considering the entire working life, but does not require it. That is, SE is ideally considered across the lifespan as early exposure to certain conditions could determine later SE (Prakash et al., 2016). However, our framework allows for studying SE across shorter timespans as well, of which future research should determine the ideal length. These aspects of our conceptualization provide researchers with flexibility as well as a clear criterion to establish whether studies actually capture SE.

A second implication for SE research is that there is work to be done in terms of mapping the employment characteristics that may constitute sustainable employment. Arguably, this is a daunting exercise, but as sustainable employment can be related to capabilities (e.g. van der Klink et al., 2016) and person-environment fit (e.g. Kristof-Brown et al., 2005), researchers have a clear starting point. For example, aspects that individuals value in their work or the extent to which certain job characteristics interact with individual characteristics in constituting a good fit could be considered. Additionally, researchers may draw from previous research on quality of working life and job characteristics (Baba & Jamal, 1991; Hackman & Oldham, 1976; Mirvis & Lawler, 1984; Taylor, 1979) the job-demands resources framework (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), and decent work (e.g. Dharam, 2003) to identify characteristics that contribute to SE. Similarly, researchers could follow Hacker's (1986) hierarchical work evaluation criteria to identify employment characteristics that make work i) executable; ii) protective of health; iii) protective of functioning; and iv) contribute to personal development. These several research streams and theoretical frameworks could reveal which employment characteristics are relevant to SE. However, within the proposed SE

framework, it is necessary to consider the effects of these several characteristics both on the integral construct of SE and longitudinally.

Third, our proposed conceptualization of SE may be instrumental in other streams of research. That is, studies considering sustainability in organizations (Mohrman & Worley, 2010), sustainable human resource management (App, Merk, & Büttgen, 2012), and sustainable work systems (Zink, 2014) have approached sustainability as non-exploitative utilization of (human) resources. As such, they could arguably use SE as a relevant criterion to capture the extent to which employees are 'exploited' over time. Although such broad concepts probably require multiple indicators (e.g. also incorporating effects on the environment and other stakeholders), SE may adequately cover the individual level and provide directions for clarifying sustainability in these streams of research.

Fourth, considering how we and others conceptualize SE, SE should be recognized as a social construct rather than a latent individual characteristic. That is, conceptualizing SE as a complex multi-indicator construct covering a broad conceptual domain makes it highly unlikely that SE constitutes a latent characteristic that exists in individuals. Instead SE should be considered a social construct of which the exact meaning (i.e. indicators) can be contextually dependent (see Fleuren et al., 2018). As such, the indicators we propose might be further supplemented or replaced if research identifies additional or improved indicators for SE. That is, the present paper argues that SE should be captured as a longitudinal multidimensional individual-level construct covering functioning at work and in the labor market, but its exact set of indicators could arguably be further developed. Still, we consider our current framework an important step forward in the debate on SE.

Finally, the complex multidimensional nature of SE likely requires interdisciplinary research. That is, our conceptualization of SE includes constructs from the health, well-being, and employability domains. Therefore research projects on SE likely benefit from a team of researchers with expertise in various domains of employment-related research. For example to capture the relationship between organizational aspects and SE, insights from HRM experts are indispensable. Similarly, as we have done for this study, it is instrumental to draw on expertise in work- and organizational psychology, occupational epidemiology, and labor economics to respectively address the well-being, health, and employability components of SE.

Implications for HRM practice

Although this paper is conceptual in nature and mainly aims to improve the scientific understanding of SE, it also has at least two implications for practice. First, the proposed conceptualization of SE clearly positions it as a shared responsibility of the individual and their employer. As such, organizations should recognize this responsibility, place promoting their employees' SE on the HR agenda, and actually begin to facilitate their employees in attaining SE. Consequently, HR managers will need a broad understanding of what SE is and how it can be addressed. The present paper could arguably help them in achieving this understanding, but more research in the employment characteristics that determine SE is necessary. Second, the requirement of considering SE as longitudinal and multifaceted construct that requires an individual-focused approach also generalizes to HR practice. That is, if HR managers or consultants wish to promote individuals' SE, it likely requires longitudinal monitoring as well as a personalized approach to SE (i.e., considering person-environment fit and capabilities as probable antecedents). As such, HR managers should strive to maintain an ongoing future-oriented dialogue with employees to identify opportunities and bottlenecks in achieving SE.

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Chapter 4

Measuring sustainable employability as a formative construct

This chapter is based on: Fleuren, B. P. I., van Amelsvoort, L. P. G. M., Zijlstra, F. R. H., de Grip, A., & Kant, I. (2018). Handling the reflective-formative measurement conundrum: A practical illustration based on sustainable employability. *Journal of Clinical Epidemiology*, 103, 71-81. doi: <https://doi.org/10.1016/j.jclinepi.2018.07.007>

Abstract

Constructs capturing health or functioning can have reflective and/or formative measurement models. Although a construct's measurement model has extensive implications on the construction, validation and use of a measurement instrument, measurement models are frequently wrongly or not explicitly specified. As this is likely due to a lack of guidelines, this study uses sustainable employability as an example to demonstrate a) the applicability of an adapted checklist for establishing a construct's measurement model; and b) the use of structural equation modelling to handle formative constructs. First, the checklist is applied to sustainable employability to establish its measurement model. Second, using observational self-report data from 2,544 employees, structural equation models are estimated to evaluate the structural and criterion validity of sustainable employability as a formative construct. The checklist demonstrates strong applicability, identifying sustainable employability as a formative construct. Model fit indices (CFIs $\geq .932$, TLIs $\geq .925$, RMSEAs $\leq .034$) suggest the formative measurement model for sustainable employability is valid. The checklist and structural equation modelling facilitate handling formative constructs. By establishing sustainable employability as a formative construct, individuals' long term ability to function at work can be more adequately studied and intervened upon.

Introduction

Capturing that which cannot be directly observed is a common challenge in (bio) medical- and social sciences. Complex multidimensional variables are abundantly constructed in an effort to capture what we think are real – or relevant – phenomena (e.g. functioning, severity of disease, life history strategies, quality of life, psychological disorders, and socio-economic status). However, constructing such complex constructs is neither straightforward nor without pitfalls. Perhaps one of the most fundamental issues in measurement model literature is the distinction between *reflective-* and *formative* measurement (Bollen & Bauldry, 2011; Bollen & Lennox, 1991; Diamantopoulos et al., 2008; Diamantopoulos & Winklhofer, 2001; Edwards, 2011; Fayers & Hand, 2002; Jarvis, MacKenzie, & Podsakoff, 2003; Streiner, 2003).

Jarvis et al. (2003, p. 200) describe *reflective measurement models* (or constructs based on effect indicators) as models “where the covariation among the measures is caused by, and therefore reflects, variation in the underlying latent factor”. In simpler terms, the (variations in) observed item scores are, in reflective models, considered to be caused by (variations in) the underlying latent construct. For example, it is because person A’s experiences a high amount of fatigue that person A scores high on items 1, 2, and 3, measuring fatigue. As the assumption of unidimensionality prescribes, all indicators (items) measure the same underlying construct, they are supposed to be correlated and show internal consistency. Moreover, removing indicators from the measurement model does not alter the meaning of the construct as all indicators reflect the same underlying construct (Jarvis et al., 2003). For example, if one of the three items measuring fatigue is removed, the remaining two items still measure fatigue and fatigue could still be measured adequately (Figure 4.1A).

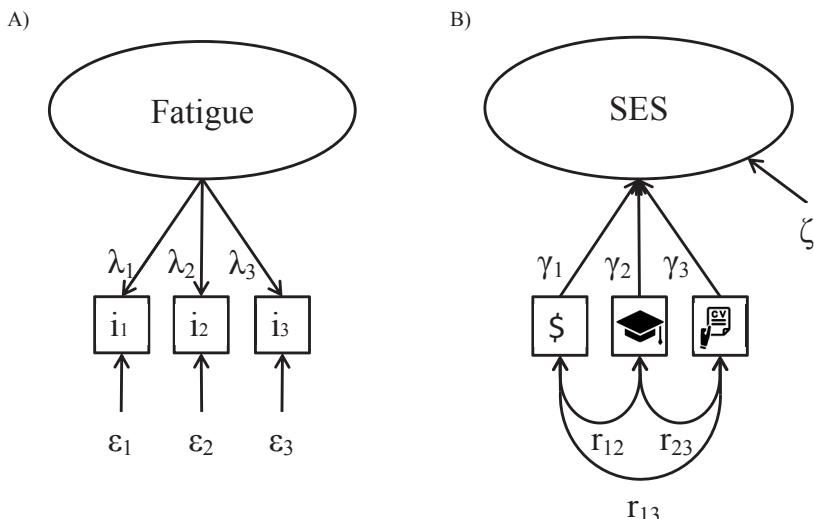


Figure 4.1. Examples of a reflective- (A) and a formative (with causal indicators) measurement model (cf. Diamantopoulos, Riefler, & Roth, 2008). In Figure 4.1A the latent variable fatigue causes scores on the three items, all measuring the same construct. Item-level error is depicted by the ε 's and factor loadings by the λ 's. In Figure 4.1B the not-directly observable variable socioeconomic status (SES) is caused by scores on the items, each measuring a different aspect of SES (i.e. income, education level, and occupation). Weights on formative construct are depicted by the γ 's, possible correlations by the r 's and the error term of the construct by the ζ . In both figures square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated from the items.

Formative measurement models (or constructs based on causal or composite indicators) are conceptualized as having precisely the opposite causal directionality. That is, formative (as opposed to underlying) constructs are caused by scores on the observed items (Jarvis et al., 2003). For example, person A is considered to have a high socio-economic status (SES), because (s)he has a high income, a high education level, and a prestigious occupation. Contrary to the assumption of unidimensionality in reflective models, indicators in formative models measure different aspects that together *form* a hypothesized formative factor. Consequently, indicators can, but are not required to, be correlated. Therefore, internal consistency is not an issue, but measurement error cannot be estimated at the indicator level either. Moreover, if one of the formative indicators is removed from the measurement model, the meaning of the construct the indicators form can change (Jarvis et al., 2003). For example, if the income item is removed from the SES measurement model, the

education and occupation items combine into a different construct that can no longer be referred to as SES (Figure 1B). Additionally, where reflective indicators are all of the same type, formative indicators can be differentiated as being of the causal, composite or covariate indicator type (Bollen & Bauldry, 2011). Causal indicators literally cause the construct they indicate and, although unlike reflective indicators they can cover conceptually distinct aspects of a construct, they share conceptual unity as all indicators cause the same construct. Consequently, the focal construct is considered to exist independently of its measurement and is captured as a combination of its indicators and a disturbance term (Bollen & Bauldry, 2011; Bollen & Diamantopoulos, 2017a; Hardin, 2017). Contrastingly, composite indicators are weighted and summed to create a construct without a disturbance term and do not necessarily share conceptual unity (Bollen & Bauldry, 2011; Bollen & Diamantopoulos, 2017a). The focal construct is thus no latent variable that exists independently of its measurement, but can be an arbitrary combination of composite indicators (e.g. an index variable) (Bollen, 2007; Bollen & Bauldry, 2011). Finally, formative indicators of the covariate type do not indicate the construct itself, but should be included as control variables to enable adequate measurement of the focal construct (Bollen & Bauldry, 2011).

The theoretical distinction between reflective- and formative measurement has five major implications and consequences. First, for a complete conceptual understanding of a construct, awareness of the nature of its measurement model is crucial (Borsboom, Mellenbergh, & van Heerden, 2003, 2004; Gruijters & Fleuren, 2018). That is, a reflective measurement model is only appropriate when the construct under study corresponds to a real latent property or process. Contrastingly, a formative measurement model implies that the construct under study is an operationalization of a multidimensional (Bollen & Diamantopoulos, 2017a) (social) construct (cf. Guyon, 2018) or a summary of various conceptually distinct variables. Second, as shown by Law and Wong (1999) and as discussed by Diamantopoulos, Riefler and Roth (2008), misspecification of a reflective measurement model as formative (or vice versa) can greatly bias estimates of structural relationships among variables and produce theoretically meaningless indices of model fit. Third, where reflective models assume unidimensionality and construct validity can be assessed through factor analysis, formative measurement models do not assume unidimensionality and their validity assessment is far more complicated (e.g. Hardin, 2017; Jarvis et al., 2003). Although it is technically possible to estimate a statistic representing the internal consistency of a formative

construct (e.g. Cronbach's alpha), the resulting estimate has no interpretational value, nor does it 'prove' the existence of a single latent variable underlying the indicators (cf. Gruijters & Fleuren, 2018). As such, researchers aiming to validate formative constructs are restricted to complicated ways of assessing content (nomological), criterion (concurrent or predictive), and structural validity (e.g. Hardin, 2017; Jarvis et al., 2003). Fourth, because a standalone construct with a formative measurement model lacks scaling, it is impossible to estimate such a model (e.g. Edwards, 2011). Instead, formative models depend on the inclusion of reflective indicators/outcomes to achieve model identification (Diamantopoulos et al., 2008; Diamantopoulos & Winklhofer, 2001). Fifth, interventions aiming to improve the scores on a formative construct can target individual indicators of the construct as they 'cause' the construct (Bollen & Diamantopoulos, 2017a). Considering these important implications, the distinction between reflective- and formative measurement is not merely conceptual nitpicking. Instead, a good match between definition and measurement model specification is indispensable.

Despite its relevance, the issue of explicitly specifying a measurement model as reflective or formative is often overlooked. That is, constructs are easily assumed to have reflective measurement models, for which clear standards for validity assessment and modeling exist. For example, Jarvis et al. (2003) show in an extensive review that in marketing and consumer research 336 out of 365 constructs that should be modeled as formative were modeled as reflective. But the issue is likely much broader, also inflicting health measurement studies. For example, two recent studies in this journal that despite using the COSMIN checklist – a standard tool for evaluating the quality of measurement instruments (Mokkink et al., 2010; Terwee et al., 2007) – do not explicitly mention the formative-reflective measurement distinction (van Melle, van Stel, Poldervaart, de Wit, & Zwart, 2018; Wong, Lang, & Lam, 2016). In our view this may be due to the little attention many researchers, health measurement instruments, and guidelines such as the COSMIN checklist pay to the distinction. That is, the COSMIN only includes one item addressing the distinction and provides no further guidelines for formative measures (Terwee et al., 2011). The little attention the assessment and evaluation of formative measurement models receive might be attributed to the higher complexity of identifying and handling these models. This higher complexity has led several researchers to argue against using formative measurement (Bagozzi, 2007; Edwards, 2011; Guyon, 2018; Howell, 2014; Howell, Breivik, & Wilcox, 2007a, 2007b; Wilcox, Howell, & Breivik, 2008). However, although reflective measurement is preferable whenever

possible, it is simply not suitable for some constructs (Bollen & Diamantopoulos, 2017a, 2017b). Therefore, rather than abandoning formative measurement altogether, it seems instrumental to broaden researchers' perspectives and make handling formative measurement more accessible.

The present paper aims to make handling the issue of reflective versus formative measurement less daunting. Specifically, we first aim to introduce an adapted version of a systematic checklist for identifying the – reflective and/or formative – nature of a construct's measurement model based on Jarvis et al. (2003). Here, our approach consists of applying the checklist to the relevant and relatively novel construct of *sustainable employability*. Second, we aim to demonstrate the applicability of structural equation modeling for handling formative constructs. To this end, we estimate a series of complementary formative models for sustainable employability that provide insight in mainly its criterion validity and the structural validity of sustainable employability as a formative construct. Finally, by subjecting sustainable employability to these conceptual and statistical analyses, we intend to provide important insights in the construct itself, the implications of its theoretical measurement model, and the weights of its components (cf. Hardin, Chang, Fuller, & Torkzadeh, 2011). As such, 'handling' in the title of this article covers identifying a construct's measurement model given its definition, validating it, and carefully considering its implications.

Sustainable employability

Sustainable employability is a relatively novel yet relevant topic in the field of occupational health research. Put simply, the construct of sustainable employability intends to capture an individual's ability to function at work and on the labor market throughout their working life (cf. van der Klink et al., 2016). This construct's relevance seems obvious as the aging of the population in most industrialized countries pushes for extended working lives. However, so goes the reasoning, working lives cannot simply be extended without any facilitation. As such, the concept of sustainable employability emerged as a relevant criterion to identify the conditions that enable individuals' long-term participation in work. However, being a novel concept, clarity on sustainable employability's conceptualization and measurement is still needed (Fleuren, de Grip, Jansen, Kant, & Zijlstra, 2016). Thus, in addition to providing a generalizable illustration of handling the reflective-formative measurement distinction, the present article also provides necessary conceptual clarity on sustainable employability.

Throughout our paper we use Fleuren et al. (2015)'s definition of sustainable employability as it meets the criteria an adequate definition of sustainable employability should meet (cf. Fleuren et al., 2016):

"Sustainable employability means that an individual's ability to function in current- and future work is not negatively affected by that individual's employment over time. An individual's ability to function in current- and future work in this context consists of a set of characteristics (i.e. productivity, skill gap, employability, need for recovery, fatigue, subjective health, workability, motivation, and job satisfaction) that collectively describe the degree to which an individual can be employed at different points throughout the working life" (Fleuren et al., 2015, p. 10)

This definition describes sustainable employability as a second-order construct with an inherently longitudinal nature. At one point in time this second-order construct is a combination of nine first-order factors (i.e. performance, skill gap, etc.; Figure 4.2) that serve as sustainable employability's indicators. These first-order factors are in turn measured by reflective items from validated scales. As such, the subject of discussion is whether the first-order factors are either reflective- or formative indicators of sustainable employability. Consequently, if sustainable employability is identified as a formative construct, it would be a 'reflective first-order, formative second-order construct' (Jarvis et al., 2003). This is favorable as a purely formative measurement model would *wrongly* assume that the indicators measure the intended construct perfectly (Edwards, 2011). That is, self-report items are (almost) never free of measurement error and an adequate measurement model should quantify and filter item-level error out of the factors. As a reflective first-order formative second-order model allows for the estimation of item-level error (Edwards, 2011), and the hypothetical formative measurement model for sustainable employability (See Figure 4.2) would follow this structure, it would not wrongly assume absence of measurement error on the item-level. As such, by including latent factors as formative indicators, this type of model differs from the exclusively formative models as typically discussed in the literature in a desirable way.

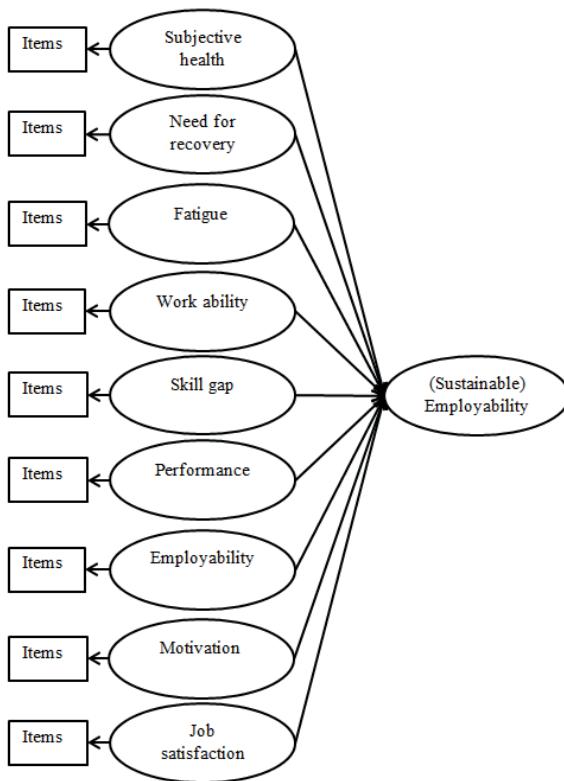


Figure 4.2. Schematic depiction of the theoretical formative measurement model of sustainable employability at a single point in time.

Methods

The checklist

To address our first aim of identifying the appropriate measurement model for sustainable employability an adapted version of the checklist as formulated by Jarvis et al. (2003) was used. This checklist consisted of a set of six objective criteria to determine whether a construct has a reflective- or formative measurement model (see the left column of Table 4.1 for the six criteria as adapted from the original checklist). The original checklist was adjusted to achieve more parsimonious wording of the items, and to incorporate the distinction between causal- and composite formative indicators (item 3) (Bollen & Bauldry, 2011), which was not incorporated in the original checklist.

Table 4.1. Application of Jarvis et al.'s (1) checklist to sustainable employability (SE)

| Checklist item | Application to sustainable employability |
|--|--|
| 1. Are the indicators (items) (A) defining characteristics or (B) manifestations of the construct? – 'A' indicates a formative- and 'B' a reflective measurement model. | As mentioned in the manuscript, the indicators of SE are the first-order factors (i.e. performance, skill gap, employability, need for recovery, fatigue, subjective health, workability, motivation and job satisfaction). The definition states "an individual's employability in this context consists of a set of characteristics ... that describe the degree to which an individual can be employed in a type of employment situation". The word 'describes' indicates that the first-order factors are defining characteristics of SE. Therefore, the answer to this question is A suggesting formative measurement. |
| 2. Would changes in the indicators/items cause changes in the construct or the other way around? – The former indicates formative and the latter reflective. | For SE, it seems counter-intuitive that the construct itself would change, independently of a change in its indicators. Rather, a specific aspect of the construct would change (i.e. one of the first-order indicators), and as a result the overall construct would change. For example, an individual's health may be affected negatively, which reduces that individual's ability to function in work. Thus, causality flows from the first-order factors to the second-order factor and a formative measurement model would be more appropriate. |
| 3. Should each indicator capture exactly the same? 'Yes' indicates reflective; 'no, but they share conceptual unity in terms of causing a common construct' indicates causal formative; and 'not at all' indicates composite formative indicators. | The first-order factors in the definition of SE are drawn from three different disciplines and are all selected to cover a different aspect of SE. Therefore, each first-order indicator is different from the others and a formative measurement model would be more appropriate. Furthermore, SE's formative indicators should theoretically all be distinct aspects of SE that all provide a theoretically meaningful contribution. In that sense they do share conceptual unity in this sense and are not an arbitrary mix of indicators. Therefore, SE's formative indicators are of the causal rather than the composite kind. |
| 4. Would dropping one of the indicators alter the conceptual domain of the construct? 'Yes' indicates formative; 'no' indicates reflective. | Each of the first-order indicators of SE covers a distinct aspect. If one of the indicators would be dropped, the second-order construct SE would no longer include that aspect and would be conceptually different from the construct with the indicator included. Again, a formative measurement model seems more appropriate. |

Table 4.1 continued

| Checklist item | Application to sustainable employability |
|---|---|
| 5. Should a change in one of the indicators be associated with changes in the other indicators? 'Yes' indicates reflective; 'no' indicates formative. | The indicators of SE are potentially but not necessarily interrelated. For example, a change in health can be related to a change in skill gap; someone may lose his arms and his typing skills simultaneously. However, this is not always the case as someone may suffer from an illness but can still be fully skilled for the job. Moreover, a change in need for recovery may only manifest itself in a change in work ability at a later point in time. Therefore, changes in one of SE's first-order indicators can, but do not need to be related to changes in the others. Thus, a formative measurement model seems more appropriate. |
| 6. Are the indicators expected to have the same antecedents and consequences? 'Yes' indicates reflective; 'no' indicates formative. | The indicators of SE can be affected by different aspects of employment. For example, working time arrangements can cause increases in need for recovery and fatigue, while skill gap and job satisfaction may remain unaffected. Thus, also for this final question the answer indicates that a formative measurement model should be used to conceptualize SE. |

Analyses

To address our second aim, four complementary model-types were fitted to establish the structural validity of sustainable employability as formative construct. We describe the rationale and results of the most complex and notable model-type in this paper. Specifics regarding the other three model-types are reported in Appendix A of the dissertation (sections D-G, p. 266-278). Importantly, each model, including the one discussed in this paper, has its own (dis)advantages and we recommend using all four modeling approaches complementarily. However, due to the extensive descriptions they require we could not report all models in this paper. All models were estimated using Mplus 7.

The main model we estimated to assess the validity of sustainable employability's formative indicators together as a set was a multiple indicator multiple cause (MIMIC) model (Figure 4.3). A MIMIC-model was used because standalone formative measurement models would not be identified using structural equation modeling (SEM) software (Bollen & Bauldry, 2011). Therefore, we used three

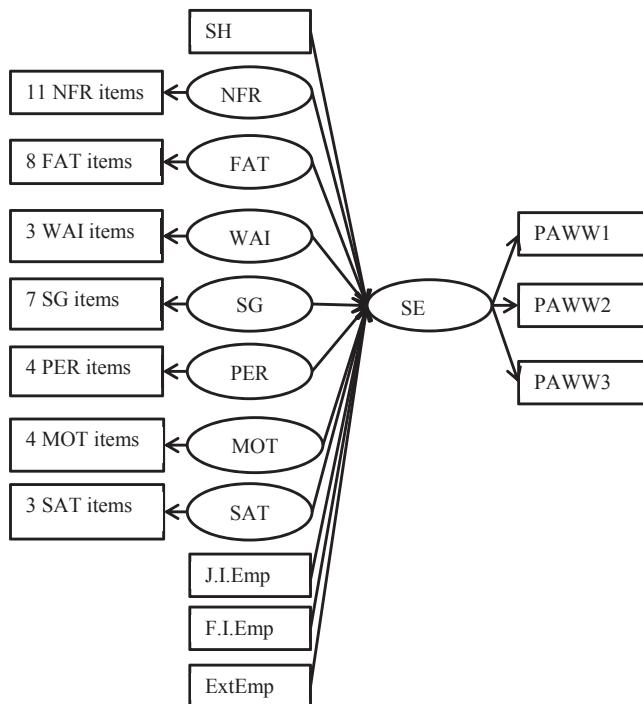


Figure 4.3. Schematic depiction of the MIMIC-model including all of the formative indicators of SE as and the three PAWW items as reflective indicators. The model depicts all formative indicators of SE as well as the three reflective PAWW items. Square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated from the items. All variables in the middle column are the formative indicators of SE. All variables in the right column are PAWW items. All variables in the left column are items corresponding to the latent formative indicators of SE. Abbreviations are intended as follows: SE = sustainable employability; SH = subjective health; NFR = need for recovery; FAT = fatigue; WAI = work ability; SG = Skill gap; PER = performance; MOT = motivation; SAT = job satisfaction; J.I.Emp = job internal employability; F.I.Emp = firm internal employability; ExtEmp = external employability; PAWW = perceived ability and willingness to work until the official retirement age.

items capturing perceived ability and willingness to work until the age eligible for retirement, to achieve model identification. These items were selected because the reflective indicator(s) in a MIMIC-model should either theoretically be outcomes of the construct or capture it entirely. As the perceived ability and willingness to work items were used in a previous study to operationalize sustainable employability (Oude Hengel, Blatter, Geuskens, Koppes, & Bongers, 2012), and should theoretically be outcomes of sustainable employability (i.e. as reality precedes

perception), we considered them adequate reflective indicators for our model. In the resulting MIMIC-model the formative construct as scaled by the perceived ability and willingness to work items was regressed on the formative indicators (i.e. the nine dimensions of sustainable employability) to obtain weights for each of the formative indicators. Indices of model fit (Diamantopoulos et al., 2008; Diamantopoulos & Winklhofer, 2001) interpreted using conventional criteria (i.e. CFI > .90, TLI > .90, RMSEA < .05) (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996) and the variance of the error term of the construct (Diamantopoulos et al., 2008; Diamantopoulos & Siguaw, 2006; Williams, Edwards, & Vandenberg, 2003) were used to assess structural validity.

Sample

The aforementioned analyses were performed using data from the prospective Maastricht Cohort Study. The ongoing Maastricht Cohort Study started in May 1998 as a large scale longitudinal study on various relationships between aspects of work and the development of fatigue. At baseline (i.e. 1998) it included 12140 Dutch respondents, aged between 18 and 65, working in 45 different organizations. All respondents provided written informed consent and data for all of the Maastricht Cohort Study waves was collected in accordance with the Declaration of Helsinki (1964) and its later amendments (see Kant et al., 2003 for more information). The protocol for the Maastricht Cohort Study is approved by the Medical Research and Ethics Committee of the Maastricht University Medical Centre under number MEC 08-4-032.

Specifically, data from the 2012 measurement wave of the Maastricht Cohort Study were used. This measurement wave contained all of the self-report measures necessary to analyze the MIMIC-model. Before exclusion, this dataset contained 4,783 respondents (1207 female, 3497 male, 85 missing), ranging in age from 34.59 years to 78.97 years old ($M = 57.57$, $SD = 8.43$, $n = 4783$). As measures used in the analyses were designed for working individuals, a total of 2,239 respondents were excluded because they were not working at time of survey completion or because they had more than one job (details regarding exclusion criteria can be found in section A of the Appendix, p. 251). A total of 2,544 respondents (771 female, 1,736 male, 37 missing) ranging in age from 34.59 to 71.33 ($M = 53.14$, $SD = 6.34$) remained for inclusion in the analyses.

Instruments

The Maastricht Cohort Study 2012 wave contained many self-report measures for various work-, work-context and individual characteristics. Among this set were subjective health, need for recovery, fatigue, work ability, skill gap, performance, employability, motivation to work, and job satisfaction, and perceived ability and willingness to work until the age eligible for retirement. Brief descriptions of the scales that were used in the analyses can be found in Table 4.2. Further descriptions of the scales as well as their factor structure can be found in Appendix A (section B, pages 252-255).

Results

Application of the checklist to sustainable employability

As demonstrated in Table 4.1, applying the checklist reveals that sustainable employability should be considered as a formative construct, necessitating a measurement model suited for such a construct. Specifically, as the relationship between the observed indicators (i.e. scale items) and the first-order factors is reflective, a so-called “reflective first-order, formative second-order model” (Jarvis et al., 2003) most adequately describes sustainable employability (Figure 4.2). Sustainable employability is thus a formative combination of nine reflective first-order factors. Moreover, considering the response to item three, sustainable employability’s formative indicators seem to be of the causal type specifically.

Modeling sustainable employability as a formative construct

In this section we discuss the results of the main MIMIC-model as described under ‘Analyses’. Results from the other complementary models and confirmatory factor analyses can be found in the electronic supplement. As described in Appendix A (sections C-H, pages 256-281), all models fitted the data well and produced expected results.

The main MIMIC-model we tested included sustainable employability’s formative indicators and the three perceived ability and willingness to work items as reflective indicators (Figure 4.3). The MIMIC-model fitted the data well ($\chi^2 = 3670.051$, df = 1073, $p > .01$, CFI = .937, TLI = .930, RMSEA = .031 (90% C.I. = .030 - .032)) and six out of eleven path coefficients between the sustainable employability’s formative indicators and the second-order factor sustainable employability

Table 4.2. Summary of scales used in analyses

| Construct measured | Scale used | Sample item |
|---------------------------|--|--|
| 1. Subjective health | Single item; MOS 36-item Short-Form Health Survey (SF-36) questionnaire (Ware & Sherbourne, 1992). | 'In general, would you say your health is: 1) excellent; 2) very good; 3) good; 4) fair; 5) poor' |
| 2. Need for recovery | 11 items; Need for recovery scale from the Dutch Questionnaire on the Experience and Evaluation of Work (VBBA) (van Veldhoven & Broersen, 2003; van Veldhoven & Meijman, 1994). | 'By the end of the working day, I feel really worn out'; Yes/No |
| 3. Fatigue | 8 items; Subjective experience of fatigue subscale from the Checklist Individual Strength (CIS) (Vercoulen et al., 1994). | 'I feel tired'; 7-point Likert |
| 4. Work ability | 3 items; Work Ability Index (Ilmarinen, 2006, 2007). | 'If you were to rate your work ability as a 10 out of 10 in the best period of your life, how would you rate your current work ability on a 10 point scale?' |
| 5. Skill gap | 9 items; adapted from the HBO-monitor (Hamburg & van der Velden, 2016). | 'How would you rate your own level of Skill X'; 5-point low-high. 'What is the level of Skill X required by your job'; 5-point low-high |
| 6. Employability | 3 single items; 1 self-constructed, 2 adapted from a self-report employability questionnaire by De Cuyper and De Witte (2011). Each measured a different aspect of employability | 'I am convinced that I could keep my current job until retirement, if I wanted to'; 5-point Likert |

Table 4.2 continued

| Construct measured | Scale used | Sample item |
|--|--|---|
| 7. Performance | 4 items; adapted from the Dyne and LePine (1998) Core Task Performance Scale. | 'I meet the performance standards of my job'; 5-point Likert |
| 8. Motivation | 4 items; Motivation subscale from the CIS (Vercoulen et al., 1994). | 'I feel no desire to do anything'; 7-point Likert |
| 9. Job satisfaction | 3 items; from a shortened 12-item version of the Utrecht Work Engagement Scale (UWES) (Schaufeli, Salanova, Gonzalez-Roma & Bakker, 2002). | 'I am enthusiastic about my job'; 7-point never-every day |
| 10. Perceived ability and willingness to work until the official retirement age (PAWW) | 3 items; adapted versions of items from van Dam, van der Vorst, and van der Heijden (2009). | 'I believe to be mentally able to continue working in my current job until the retirement age that currently applies to me'; 5-point Likert |

were significant (Table 4.3). Moreover, the R-square of the second-order factor sustainable employability was .30, indicating the amount of variance in sustainable employability as explained by its formative indicators. These findings suggested that a formative measurement model for sustainable employability fitted the data well and that the formative indicators functioned well together as a set.

Table 4.3. Path coefficients for the effects of first-order factors on the second-order factor employability consisting of three reflective indicator items in a full MIMIC-model

| First-order factor | Path coefficient | Standard Error | Est./S.E. | P-value |
|-------------------------------------|------------------|----------------|-----------|---------|
| 1. Subjective health (1 item) | .028 | .025 | 1.103 | .270 |
| 2. Need for recovery | .211* | .035 | 5.975 | .001 |
| 3. Fatigue | .053 | .045 | 1.178 | .239 |
| 4. Work ability | .343* | .040 | 8.500 | .001 |
| 5. Skill gap | .031 | .024 | 1.290 | .197 |
| 6. Performance | -.029 | .023 | -1.257 | .209 |
| 7. Employability (3 separate items) | | | | |
| 1) Job internal employability | .141* | .019 | 7.626 | .001 |
| 2) Firm internal employability | .024 | .020 | 1.236 | .216 |
| 3) External employability | -.060* | .020 | -2.965 | .003 |
| 8. Motivation | -.123* | .042 | -2.929 | .003 |
| 9. Job satisfaction | .058* | .026 | 2.255 | .024 |

Note. Reported path coefficients are standardized, transcribed from the Mplus 7 STDYX output;
 * = significant at $p < .05$

Discussion

This paper intends to provide researchers with tools to handle the reflective-formative measurement conundrum. To that end it first demonstrates how the nature of a construct's measurement model can be identified using an adapted version of the checklist by Jarvis et al. (2003). Second, it shows how structural equation modeling (SEM) can be used to gain insight in the criterion and structural validity of modeling formative indicators to form a single construct. By using sustainable employability (sustainable employability; (Fleuren et al., 2015)) as a

working example, the paper also provides much needed clarity on this construct's nature and validity as a formative construct. Specifically, we show it is feasible to measure sustainable employability as a 'reflective first-order, formative second-order construct' (1), where the formative indicators are subjective health, need for recovery, fatigue, work ability, performance, employability, skill gap, motivation and job satisfaction. Additionally, the results from the models in this article and Appendix A may inform researchers about possible weights for sustainable employability's indicators in future studies and may hint to the relative importance of each component. Although our approach has some limitations (as discussed below), it does provide researchers with the means to handle formative construct as well as an elaboration of the extensive implications that come with it (see further in this section). As such, researchers working with complex (health) constructs such as quality of life, functioning and severity of disease, can use this paper to check assumptions about the measurement models of these constructs and to model them more appropriately if they are formative. Consequently, research and interventions involving such complex constructs can be performed more adequately, so that biased estimations and ineffective approaches can be detected and avoided. In some cases this may require reconsideration of constructs that are currently perceived as valid and used in practice.

Limitations

A first limitation to this study is that the results of the MIMIC-models we estimate depend on the choice of the reflective indicators for sustainable employability. That is, the reflective indicators determine the path coefficients of the formative indicators to the construct as well as their significance levels. However, as no alternative approaches to assessing the structural validity of formative constructs exist, this limitation could not be avoided. Therefore, we carefully selected straightforward outcomes of sustainable employability as reflective indicators in our models (i.e. perceived ability and willingness to work until the retirement age). Moreover, we tested several complementary models of which some did not include the additional perceived ability and willingness to work items as reflective indicators (see Appendix A sections G and H). As such, the indicators we use should theoretically be appropriate and it is unlikely that our results are biased because of this limitation. Additionally, this limitation would only apply to our models for sustainable employability and not to the general illustration provided in this paper. Nonetheless, this point does underscore the importance of carefully selecting appropriate reflective indicators for MIMIC-models.

A second limitation specific to our example of sustainable employability is that we only investigate its measurement model at one point in time. This is suboptimal as sustainable employability is an inherently longitudinal construct (Fleuren et al., 2015), but could not be avoided due to lack of longitudinal data for most of the formative indicators used (except for those in the health domain of sustainable employability). Nonetheless, assessing sustainable employability's validity as a formative construct at one point in time is challenging enough and provides a basis for future studies that do take this longitudinal perspective. Specifically, such future studies could particularly consider sustainable employability's criterion validity more extensively by predicting employment status on the long term and timing of retirement, potentially across different groups.

Third, some of sustainable employability's formative indicators may not have been measured in the best possible way. That is, we used an existing dataset (i.e. the 2012 wave of the Maastricht Cohort Study) that featured all of the necessary constructs. As such, concessions had to be made, resulting in some of the variables to be captured by suboptimal measures (in particular employability, job satisfaction and motivation). Although factor analyses suggested that the measures did function appropriately, future research should aim to include optimal scales for all constructs. Additionally, the models we tested show acceptable fit even with suboptimal measures, which might arguably only show the robustness of the approach.

A fourth limitation relates to the retention of the formative indicators of sustainable employability. That is, ideally all path coefficients in the MIMIC-model would have been significant. However, our findings indicate otherwise. These findings are probably due to interrelatedness among sustainable employability's formative indicators. For example, if work ability and subjective health are interrelated they could partially explain the same variance in the sustain employability construct, rendering either or both indicator's path coefficients insignificant. As insignificance could signal redundancy (Costa, 2015), it may be intuitive to omit all formative indicators with insignificant path coefficients in the MIMIC-model. However, this is not necessarily the best approach because these indicators may still be theoretically relevant. Moreover, as shown in Appendix A, all indicators do demonstrate criterion validity in complementary models. Therefore, this final limitation underscores the relevance of using several complementary models when handling formative constructs.

Finally, a question of completeness remains. That is, for formative constructs there is no way of knowing whether the intended or described construct is complete given the indicators included in its measurement model (cf. Ford, 2017). This issue is unique to constructs with formative indicators, as reflective indicators are interchangeable and should all capture the same single construct. When considering completeness, the only criterion is that the measurement model as specified exactly matches the definition of the intended construct (i.e. content validity). Therefore, although researchers working with novel formative constructs may desire full confidence that their construct encompasses the intended construct completely, this cannot be achieved with statistical tests. Instead, completeness and content validity are about the match between theory and operationalization/measurement. Based on theoretical considerations and the definition of sustainable employability in Fleuren et al. (Fleuren et al., 2015), the formative indicators in our model seem to cover sustainable employability adequately.

Implications

First, the application of the checklist by Jarvis et al. (2003) as demonstrated in this paper gives researchers an easy-to-use tool to identify the nature of a constructs measurement model. The six checklist-items can be answered with relative ease to identify a construct as formative and/or reflective. Notably, as evidenced by this checklist, the reflective-formative distinction is theoretical and thus should not be made on statistical grounds (e.g. comparing models is inappropriate and impossible). However, as discussed by Bollen and Ting (2000), researchers can use a tetrad test when they remain in doubt whether their construct of interest is formative (causal) or reflective. Still, as a construct's measurement model depends on the construct's definition it may remain topic of debate. In such cases, the checklist as it may help to structure theoretical debates and to reach a well-grounded conclusion. For example, careful application of the checklist to complex constructs such as quality of life, functioning, severity of disease, and psychological disorders may provide clarity on- and deepen our understanding of these constructs. Importantly, this implies that researchers may have to reconsider constructs they have been using in studies for years. Moreover, developers of practical interventions involving such constructs may have to go back the drawing board and priorities in both research and practice may need revision as well.

A second important consequence of this paper is that it demonstrates SEM as a useful tool to handle formative constructs. That is, by using sustainable employability as an example in several complementary models, we demonstrate that SEM can be used to gain insight in the structural and criterion validity of complex formative constructs. This particularly applies to formative constructs with causal rather than composite indicators, but as Edwards and Bagozzi (2000) argue, claiming a construct is a composite variable without exploring its validity is bad practice. Importantly, as discussed, there certainly are some pitfalls to be aware of (i.e. issues of completeness (Ford, 2017), collinearity among formative indicators (Cadogan & Lee, 2013), and item-level error and model identification (Edwards, 2011)) when using presented modeling strategies, but these strategies are still superior to standard approaches for reflective measurement models (e.g. factor analyses and Cronbach's alpha). After all, these latter approaches have exactly no meaning for constructs that include formative indicators and their application to formative constructs should therefore be eradicated. With the demonstration this article provides researchers now have the tools to do so.

Third, if anything, this paper has illustrated that formative constructs deserve more attention considering their complexity and extensive implications. As such, we think that tools for assessing (health) measurement instruments should include more elaborate directions on handling formative measurement models. For example, in its current format the COSMIN checklist only includes a single item on formative versus reflective measurement (Mokkink et al., 2010; Terwee et al., 2011). This does not do justice to – nor helps researchers struggling with – the complexity of formative measurement. Given the applicability of Jarvis et al.'s (2003) checklist combined with SEM to explore formative constructs in detail as demonstrated in this paper, they could be useful extensions of checklists for assessing the quality of measurement instruments.

Finally, our findings have important implications for the use of sustainable employability in interventions and research. First, recognizing sustainable employability as a formative construct implies that interventions aiming to improve sustainable employability can theoretically target its formative indicators. That is, scores on formative constructs are determined by scores on their indicators (and not inversely as for reflective constructs). As such, interventions aiming to promote sustainable employability can theoretically target its individual constituents. Importantly, however, increases in one formative indicator of sustainable employability

could be compensated by decreases in another (which would not apply to reflective indicators). Moreover, sustainable employability as a whole is what HR practitioners strive to improve and what occupational health researchers aim to predict and understand. Therefore, sustainable employability's indicators should be considered both separately (as targets in interventions) and jointly (for scientific understanding and societal relevance) (e.g. Fleuren, van Amelsvoort, de Grip, Zijlstra, & Kant, 2018). Second, when considering formative indicators as separate entities, it theoretically makes sense to model relationships among indicators in, for example, network models (cf. Borsboom & Cramer, 2013). Considering sustainable employability's inherent connection with time, it may then be attractive to explore causality among its formative indicators at different time points (e.g. skill-gap on t_0 might predict need for recovery on t_1). These implications could lead to a better understanding of and interventions for sustainable employability specifically, but similar approaches might apply to other (health) constructs.

Conclusion

In conclusion, this paper contributes to the literature by providing an illustration of how relatively accessible tools for identifying (i.e. a checklist) and handling (i.e. SEM) formative constructs can be used. These tools enable a more adequate handling of formative constructs, so that well-founded conclusions regarding structural relations between such constructs and others can be drawn. As argued, the formative-reflective measurement distinction may thus require us to reconsider some of our well-established (health) constructs (e.g. quality of life, severity of disease, and functioning). In the end, if we wish to improve the quality of our lives, functioning and health, a thorough understanding of such constructs is indispensable.

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Chapter 5

Age and time effects on sustainable employability

This chapter is based on: Fleuren, B. P. I., van Amelsvoort, L. G. P. M., de Grip, A., Zijlstra, F. R. H., & Kant, I. (2018). Time takes us all? A two-wave observational study of age and time effects on sustainable employability. *Scandinavian Journal of Work Environment & Health*, 44(5), 474-484. doi: <https://doi.org/10.5271/sjweh.3741>

Abstract

Various cognitive and physical abilities decline with age. Consequently, sustainable employability research has focused on the labor market participation of older employees. However, it remains unclear whether age actually affects employees' work- and labor market functioning. A major complicating factor is that age effects can be distorted by time effects. That is, changes over time may not be due to aging, but to some structural difference between the times of measurement. The present article aims to provide clarity by estimating age effects on sustainable employability while controlling for potential time effects. Based on two-wave survey data from a sample of 2,672 employees (ages 35 to 65 years) multilevel regressions are estimated to analyze the effects of age and time on sustainable employability. Here, sustainable employability is operationalized as a formative construct consisting of nine dimensions, each capturing a different facet of an individual's ability to function at work and on the labor market. The analyses reveal that age has small effects on only two dimensions (employability and perceived health) and time on three dimensions (fatigue, job performance, and skill gap) of sustainable employability. Moreover, for all dimensions of sustainable employability most variance exists between (61.43%-84.96%) rather than within (15.04%-38.57%) subjects. These findings suggest that the process of aging has a limited effect on working individuals' capacities to function in their job and on the labor market. Consequently, the focus on age in the context of sustainable employability policies and research may require reconsideration.

Introduction

People's cognitive and physical abilities have been reported to change with age. Although there is quite some variability (Christensen, 2001; Finkel & Pedersen, 2004; Wilson et al., 2002), several authors describe a general decline in *cognitive* abilities with age (Beier & Ackerman, 2005; Bugg, Zook, DeLosh, Dávalos, & Davis, 2006; Christensen, 2001; Deary et al., 2009; Ferrer, Salthouse, Stewart, & Schwartz, 2004; O'Sullivan et al., 2001; Salthouse, 2009; Schaie, 1994; Wilson et al., 2002). For example, Schaie (1994) documents gradual age-related declines in the cognitive domains of verbal meaning, spatial orientation, inductive reasoning, numbers and word fluency. Relatedly, Salthouse (2009) finds that such cognitive declines start as early as at age 25 and become gradually more pronounced as aging progresses. Other researchers have found evidence for neurological (O'Sullivan et al., 2001) and genetic (Finkel & Pedersen, 2004) foundations for these age related cognitive declines. Importantly, knowledge and experience are found to accumulate (or crystallized intelligence) with age, contrasting with the declines in more fluid aspects of cognitive abilities (Salthouse, 2004). Concerning *physical* abilities, evidence for age related declines seems convincing as well. Although inter-individual variance increases with age (Maddox & Douglass, 1974; Nelson & Dannefer, 1992), at some point in early- to mid-adulthood, physical strength (Sterns, Sterns, & Hollis, 1996; Warr, 2001), endurance (McDonald, 1988), psychomotor abilities (Keys & White, 2000), sensory functions (Forteza & Prieto, 1994), and general health (Broersen, de Zwart, van Dijk, Meijman, & van Veldhoven, 1996) begin to gradually decline across individuals. Thus, although 'a gray head is a crown of glory', natural aging seems to have negative physical and cognitive side-effects (see Hedge, Borman, and Lammlein (2006) and Hedge and Borman (2012) for comprehensive overviews).

Age-related declines in abilities are frequently *thought* to affect functioning at work. A common stereotype about older employees is that they perform less well than younger employees (Posthuma & Campion, 2009). Although there are some studies that find such relationships (Skirbekk, 2004), others do not report any relationship between age and job performance (McEvoy & Cascio, 1989) or find positive associations (Ng & Feldman, 2008; Waldman & Avolio, 1986). These mixed findings can be understood by considering ways in which older employees can compensate age related declines in abilities (e.g. continuous learning and increased reliance on accumulated expertise) (Desjardins & Warnke, 2012) as well as the irrelevance of some abilities for functioning at work (e.g. because job

types and requirements may differ with age) (Hansson, DeKoekkoek, Neece, & Patterson, 1997). Additionally, within age group differences appear to be larger than between age group differences (Posthumus & Campion, 2009). As such, there is little justification for the stereotypical idea that older workers function less well at work. Still, the idea that older workers function less well seems to persist in both employers and older employees themselves (Desmette & Gaillard, 2008; Lamont, Swift, & Abrams, 2015) and affect employment decisions (Posthumus & Campion, 2009).

Aging and sustainable employability

Combined with ongoing population aging and an increasing retirement age, the presumed association between age and functioning at work has inspired research on sustainable employability (SE). SE focuses on individuals' ability to function at work and on the labor market throughout their working lives (Fleuren, de Grip, Jansen, Kant, & Zijlstra, 2015; van der Klink et al., 2016). Research on SE strives to identify the conditions that enable people to work until (or beyond) their formal retirement age. This is considered important in light of the increasing retirement age, because, so goes the reasoning working lives cannot simply be extended without any facilitation (e.g. in the form of age-conscious HR practices). Unsurprisingly, much of the early research on SE has focused on older employees (see Brouwer et al., 2012 for a comprehensive overview), who are considered at most immediate risk of labor market withdrawal. Another key assumption underlying this focus is that as the workforce is aging, the prevalence of chronic health problems increases which, in turn, is thought to have consequences on employees' SE (Brouwer et al., 2012). The question, however, is whether this focus on older employees is actually warranted by an association between age and SE.

As time plays a crucial role in the concept of SE, a potential association between age and SE would have several important implications. That is, the currently most progressive (Fleuren, de Grip, Jansen, Kant, & Zijlstra, 2016) approach to SE defines the concept as a multifaceted *longitudinal* construct (Fleuren et al., 2015). Specifically, the employability component of SE can be captured as a formative construct (Fleuren, van Amelsvoort, Zijlstra, de Grip, & Kant, 2018) consisting of nine complementary indicators of functioning at work and on the labor market (i.e. perceived health status, need for recovery, fatigue, work ability, job satisfaction, motivation to work, job performance, skill gap and perceived employability). The sustainability aspect can then be captured by considering this formative construct at

multiple points in time. Stability and growth in the construct indicate sustainability, whereas declines indicate a lack thereof (Fleuren et al., 2015). By extension, if development in these nine functioning indicators is entirely attributable to natural aging, very little can be done to promote SE. Additionally, if age affects SE to any extent, it is important to include age as a covariate when estimating effects of other employment characteristics on SE. Finally, as SE constitutes an integrative approach to functioning at work and on the labor market, research into the effects of age on SE provides broad insight into the relationships between age and a broad set of relevant occupational health variables. Thus, considering the relevance of age in the context of SE, our research question is: *How does age affect SE and each of its dimensions?*

Estimating the effect of age on sustainable employability

A major difficulty in assessing the effects of age on SE is that age effects can be distorted by time- (in the literature predominantly referred to as ‘period effects’) and cohort effects. That is, when considering development in individual characteristics over time, three interrelated aspects of time are implicitly under study: age, time (i.e. period), and cohort effects (O’Brien, 2000, 2017; O’Brien, Hudson, & Stockard, 2008; Suzuki, 2012; Yang & Land, 2008). Age effects concern the aforementioned changes in a variable that are due to aging (e.g. on average, without any vision correction, 30 year olds perform better on a vision test than 70 year olds). Time effects are systematic differences between measurement moments that are not due to aging, but due to some contextual conditions. That is, average scores on a variable could differ systematically between a first and a second measurement occasion (e.g. on average, people’s stress levels are higher during an economic crisis than in a flourishing economy), and such differences could wrongly be ascribed to aging because as time passes age increases as well. Finally, cohort effects capture the effect of belonging to a specific generation regardless of age and time of observation (e.g. people born in the 1950’s might value organizational commitment more than those born in the 1980’s). To avoid any bias in estimating the effects of age on sustainable employability, these three effects should ideally be estimated simultaneously in an Age-Period-Cohort model (APC).

Estimating APC models is problematic for two reasons. First, as argued by O’Brien (2011), age, time and cohort effects are exactly mathematically confounded. Consequently, regressing a dependent variable on age, time, and cohort variables results in collinearity problems. Second, this first issue makes it impossible to achieve model identification of an unconstrained APC model (O’Brien, 2011).

Although several researchers have developed approaches to handle these problems (e.g. O'Brien et al., 2008; Tu, Krämer, & Lee, 2012; Yang & Land, 2006, 2008), studies using empirical data (O'Brien, 2017) and simulations (Bell & Jones, 2014), but also logical arguments (Bell & Jones, 2013) suggest that APC models simply cannot be estimated without making assumptions that impose constraints. Therefore, researchers should carefully consider which constraints are theoretically reasonable given a certain research question.

Considering our research question, we constrain our approach by exploring age effects while controlling for time effects. As age is the main variable of interest in this paper it makes for an obvious candidate for inclusion. That is, we want to explore how age affects each of SE's dimensions. Additionally, as time effects cover the specific conditions at a certain time point compared to those at another time point, they most closely resemble broad differences in the employment context across time points which is the main object of interest in predicting SE. Contrastingly, cohort is a fixed variable that can and does not change as time progresses. Therefore, when exploring the effects of age on SE, time effects (i.e. how does age affect SE controlling for measurement moment?) are more interesting to control for than cohort effects (i.e. how does age affect for year/period of birth?).

Methods

Sample

The analyses were performed using data from the prospective Maastricht Cohort Study (MCS). The ongoing MCS started in May 1998 as a large scale longitudinal study on various relationships between aspects of work and the development of fatigue. At baseline (i.e. 1998) it included 12,140 Dutch respondents, aged between 18 and 65, working in 45 different organizations. All respondents provided written informed consent and data for all of the MCS waves were collected in accordance with the Declaration of Helsinki (1964) and its later amendments (see Kant et al. (2003) and Mohren, Jansen, van Amelsvoort, & Kant (2007) for more information). The Medical Research and Ethics Committee of the Maastricht University Medical Centre approved the protocol for the MCS (MEC 08-4-032).

Specifically, data from the 2012 and 2014 measurement wave of the MCS were used. These waves were selected because they contained all of the self-report measures necessary for the analyses. Before exclusion, this dataset contained 4,783

respondents in 2012 (1,207 female, 3,497 male, 85 missing), ranging in age from 34.6 years to 79.0 years old ($M = 57.6$, $SD = 8.4$, $n = 4,783$). A total of 2,111 respondents were excluded, either because they were not working at time of survey completion, had more than one job, or exceeded the mandatory retirement age of 65 in 2014. These exclusion criteria were used because most of our main variables (i.e. SE and its dimensions) were measured with instruments that make explicit reference to work and, in some cases, a single job. The latter could invite unusual interpretation of the items among people with multiple jobs and thereby invite biased responses. A total of 2,672 respondents (829 female, 1,781 male, 62 missing) ranging in age from 33.4 to 65.0 ($M = 52.9$, $SD = 6.6$) remained for inclusion in the analyses.

Instruments

The nine dimensions of SE (i.e. perceived health status, need for recovery, fatigue, work ability, skill gap, employability, performance, motivation, and job satisfaction) were assessed using validated self-report questionnaires. See Table 5.1 for an overview of all questionnaires; as the study relied on existing data it also relied on the measures available in the dataset. Consequently, motivation and job satisfaction had to be operationalized with suboptimal instruments (i.e. the motivation subscale of the Checklist Individual Strength and three work engagement items respectively). SE itself was constructed as a composite variable based on its nine dimensions (cf. Fleuren et al., 2015; Fleuren et al., 2018). That is, scores on all nine dimensions were standardized, coded in such a way that a high score on each dimension would indicate a positive contribution to SE, and then added with equal weighting. Age was captured as date of questionnaire completion minus self-reported date of birth. Finally, time was constructed by recoding the time of measurement (i.e. 2012 or 2014) into a dichotomous variable where 2012 was coded to '1' and 2014 to '2'.

Analyses

The first part of the present study's main analyses explored the effects of age on SE while controlling for time effects. These analyses consisted of ten separate multilevel regression models with age and time as independent variables and SE and each of its dimensions as single dependent variable. In these models, time of measurement (level one) was nested in participants (level two). Moreover, as two waves were included, time itself was included as a dichotomous variable. Additionally, age was included as a categorical variable with one-year categories (e.g. every participant aged from 35.0 to 35.99 belonged to the age category '35'). Including one-year age categories was most elegant as, given our sufficiently large sample, it provided the

Table 5.1. Summary of scales used in the analyses

| Construct measured | Scale used | Sample item |
|----------------------------|---|--|
| 1. Perceived health status | Single item; Medical Outcomes Study (MOS) 36-item Short-Form Health Survey (SF-36) questionnaire (Ware & Sherbourne, 1992). | 'In general, would you say your health is: 1) excellent; 2) very good; 3) good; 4) fair; 5) poor' |
| 2. Need for recovery | 11 items; Need for recovery scale from the Dutch Questionnaire on the Experience and Evaluation of Work (VBBA) (van Veldhoven & Broersen, 2003; van Veldhoven & Meijman, 1994). | 'By the end of the working day, I feel really worn out'; Yes/No |
| 3. Fatigue | 8 items; Subjective experience of fatigue subscale from the Checklist Individual Strength (CIS) (Vercoulen et al., 1994). | 'I feel tired'; 7-point Likert |
| 4. Work ability | 3 items; Work Ability Index (Ilmarinen, 2006, 2007), specifically: a) the overall rating of work ability (sample item); b) work ability given mental job demands; c) work ability given physical job demands. | 'If you were to rate your work ability as a 10 out of 10 in the best period of your life, how would you rate your current work ability on a 10 point scale?' |
| 5. Skill gap | 9 items; adapted from the Hoger Beroeps Onderwijs (HBO) monitor (Humburg & van der Velden, 2016); [translation: Higher Professional Education monitor]. | 'How would you rate your own level of Skill X'; 5-point low-high. 'What is the level of Skill X required by your job'; 5-point low-high |
| 6. Employability | 3 single items; 1 self-constructed, 2 adapted from a self-report employability questionnaire by De Cuyper and De Witte (2011), each measuring a different component. | 'I am convinced that I could ... (item 1: "...keep my current job until retirement..."; item 2: "... change jobs within my current organization..."; item 3: ... |

Table 5.1 *continued*

| <i>Construct measured</i> | <i>Scale used</i> | <i>Sample item</i> |
|---------------------------|--|---|
| | | get a job outside of my current organization...') ... if I wanted to'; 5-point Likert |
| 7. Performance | 4 items; adapted from the Dyne and LePine (1998) Core Task Performance Scale. | 'I meet the performance standards of my job'; 5-point Likert |
| 8. Motivation | 4 items; Motivation subscale from the CIS (Vercoulen et al., 1994). | 'I feel no desire to do anything'; 7-point Likert |
| 9. Job satisfaction | 3 items; from a shortened 12-item version of the Utrecht Work Engagement Scale (UWES) (Schaufeli, Salanova, Gonzalez-Roma & Bakker, 2002). | 'I am enthusiastic about my job'; 7-point never-every day |

optimal sensitivity for detecting non-linear age effects between any of the categories and in any direction, thus matching the explorative nature of our research question. Additionally, we opted for estimating ten separate models (i.e. one for SE and one for each of its dimensions separately) because SE is a formative construct (Fleuren et al., 2018). The formative nature of SE implies that each of its dimensions may be affected by age and time differently, and that each dimension may have a different weight in SE depending on a participant's occupation. Estimating the ten separate models enabled circumventing these issues while enabling the estimation of overall age and time effects on SE. Finally, for each of the ten, we estimated a fixed-effects only model, a random-intercept model and a random-intercept-random-slope model. The latter type of model allowed random slopes for the time variable only. This overall modeling approach enabled estimating both within (i.e. time) and between (i.e. age) subjects effects, while maintaining the optimal flexibility to match the explorative nature of this study. These analyses were performed using SPSS Statistics 23 (IBM, Armonk, NY, USA) and cross-checked with SAS (SAS institute, Cary, BC, USA).

The second part of our main analyses consisted of ten separate repeated measures analyses of variance (ANOVA), which served to identify the relative percentages of within- and between subjects variance in SE and each of its nine dimensions over the two times of measurement. These analyses were performed as, regardless of the magnitude and direction of the age and time effects in the first part of the main analyses, it is instrumental to establish the magnitude of the within-subjects variance over time. That is, low within-subjects variance over time would reduce the feasibility of modelling SE as a time dependent construct. These analyses were performed using IBM SPSS Statistics 23.

The main analyses were supplemented with three additional types of analysis. First, as the main analyses used data from later waves of the MCS (i.e. 2012 and 2014), we checked whether our findings regarding the age effect were consistent with results of the same analyses using data collected in the earlier waves of the MCS. To this end, we estimated the same multilevel regression models as mentioned above, but now with a total of seven time points (i.e. starting with the first wave of the MCS in 1998, to the most recent wave in 2014). However, as only three SE dimensions were included in these earlier waves, these analyses were restricted to the dimensions of perceived health status, need for recovery, and fatigue. Second, we analyzed whether drop-out of participants in these same earlier waves of the MCS was related to age, employment status and health to rule out (self-) selection bias. And third, using MCS data from the 2012 and 2014 waves, we estimated multilevel regression models with mild and heavier physical functioning impairments as dependent variable (i.e. instead of SE and its dimensions) and age and time of measurement as independent variables. These latter analyses were performed to see if our data would reveal regular age-related impairments in general physical functioning, unrelated to functioning at work.

Results

The main analysis revealed mixed result patterns for SE and each of its dimensions. First, the multilevel regression models revealed that of SE's nine dimensions only perceived health status and employability were significantly affected by age (Table 5.2). The overall SE construct was not affected significantly by age. For parsimonious reporting of results, estimated marginal means of SE and each of its dimensions are plotted per age group in Figure 5.1 to illustrate age effects. As can be observed from

Table 5.2. Overview of overall significance tests of age and time effects controlled for each other on sustainable employability and each of its aspects

| Dependent variable | F | p | df _{numerator} | df _{denominator} |
|--|---------|--------|-------------------------|---------------------------|
| <i>Perceived health status</i> | | | | |
| Age | 1.65* | 0.015 | 30 | 3320 |
| Time | 0.61 | 0.435 | 1 | 2713 |
| <i>Need for recovery</i> | | | | |
| Age | 0.62 | 0.945 | 30 | 2974 |
| Time | 0.38 | 0.540 | 1 | 2575 |
| <i>Fatigue</i> | | | | |
| Age | 1.25 | 0.165 | 30 | 3340 |
| Time | 10.24** | 0.001 | 1 | 2676 |
| <i>Work ability</i> | | | | |
| Age | 1.30 | 0.129 | 30 | 3479 |
| Time | 2.19 | 0.139 | 1 | 2387 |
| <i>Skill gap</i> | | | | |
| Age | 1.27 | 0.152 | 30 | 3407 |
| Time | 41.51** | <0.001 | 1 | 2405 |
| <i>Perceived employability</i> | | | | |
| Age | 2.89** | <0.001 | 30 | 3323 |
| Time | 0.28 | 0.597 | 1 | 2482 |
| <i>Job performance</i> | | | | |
| Age | 0.81 | 0.764 | 30 | 3550 |
| Time | 10.97** | 0.001 | 1 | 2443 |
| <i>Motivation</i> | | | | |
| Age | 1.03 | 0.427 | 30 | 3396 |
| Time | 0.09 | 0.759 | 1 | 2637 |
| <i>Job satisfaction</i> | | | | |
| Age | 1.05 | 0.392 | 30 | 3055 |
| Time | 0.64 | 0.425 | 1 | 2513 |
| <i>Sustainable employability composite</i> | | | | |
| Age | 1.17 | 0.227 | 30 | 2908 |
| Time | 1.46 | 0.241 | 1 | 2401 |

Note. *=significant at p<0.05; **=significant at p<0.001

these graphs, the age effects on perceived health status and employability were, although significant, small. That is, for perceived health status the largest estimated marginal mean difference between two age groups was .49 while the overall standard deviation was 0.75. Similarly, for perceived employability the largest difference (1.13) was only slightly higher than the standard deviation (0.80). These differences in estimated marginal means might be inflated due to the lower number of participants in the age categories on which these differences were based (i.e. the lower ages have wider confidence intervals (CI), see Figure 5.1). Additionally,

Table 5.3. Overview of within- and between subjects variance in sustainable employability and each of its dimensions based on repeated measures ANOVAs with over two points in time

| Dependent variable | SSm | SSr | SSw | SSb | SSt | %Within | %Between |
|---|-------|----------|----------|----------|----------|---------|----------|
| 1. Perceived health status | 1.32 | 431.68 | 433.00 | 1948.39 | 2381.39 | 0.18 | 0.82 |
| 2. Need for recovery | 1.80 | 6380.71 | 6382.51 | 36041.19 | 42423.7 | 0.15 | 0.85 |
| 3. Fatigue | 5.72 | 1583.05 | 1588.77 | 6811.98 | 8400.75 | 0.19 | 0.81 |
| 4. Work ability | 0.09 | 2415.41 | 2415.50 | 4641.19 | 7056.69 | 0.34 | 0.66 |
| 5. Skill gap | 8.92 | 385.45 | 394.37 | 746.44 | 1140.81 | 0.35 | 0.65 |
| 6. Employability | 0.59 | 579.21 | 579.80 | 1805.54 | 2385.34 | 0.24 | 0.76 |
| 7. Job performance | 8.66 | 1289.07 | 1297.73 | 2065.98 | 3363.71 | 0.39 | 0.61 |
| 8. Motivation | 0.19 | 1453.8 | 1453.99 | 5545.98 | 6999.97 | 0.21 | 0.79 |
| 9. Job satisfaction | 1.09 | 922.07 | 923.16 | 3935.55 | 4858.71 | 0.19 | 0.81 |
| 10. Sustainable employability composite | 33.15 | 15645.61 | 15678.76 | 78104.79 | 93783.55 | 0.17 | 0.83 |

Note. Meaning of abbreviations: SS = Sum of Squares; m = model; r = random; w = within subjects; b = between subjects; t = total.

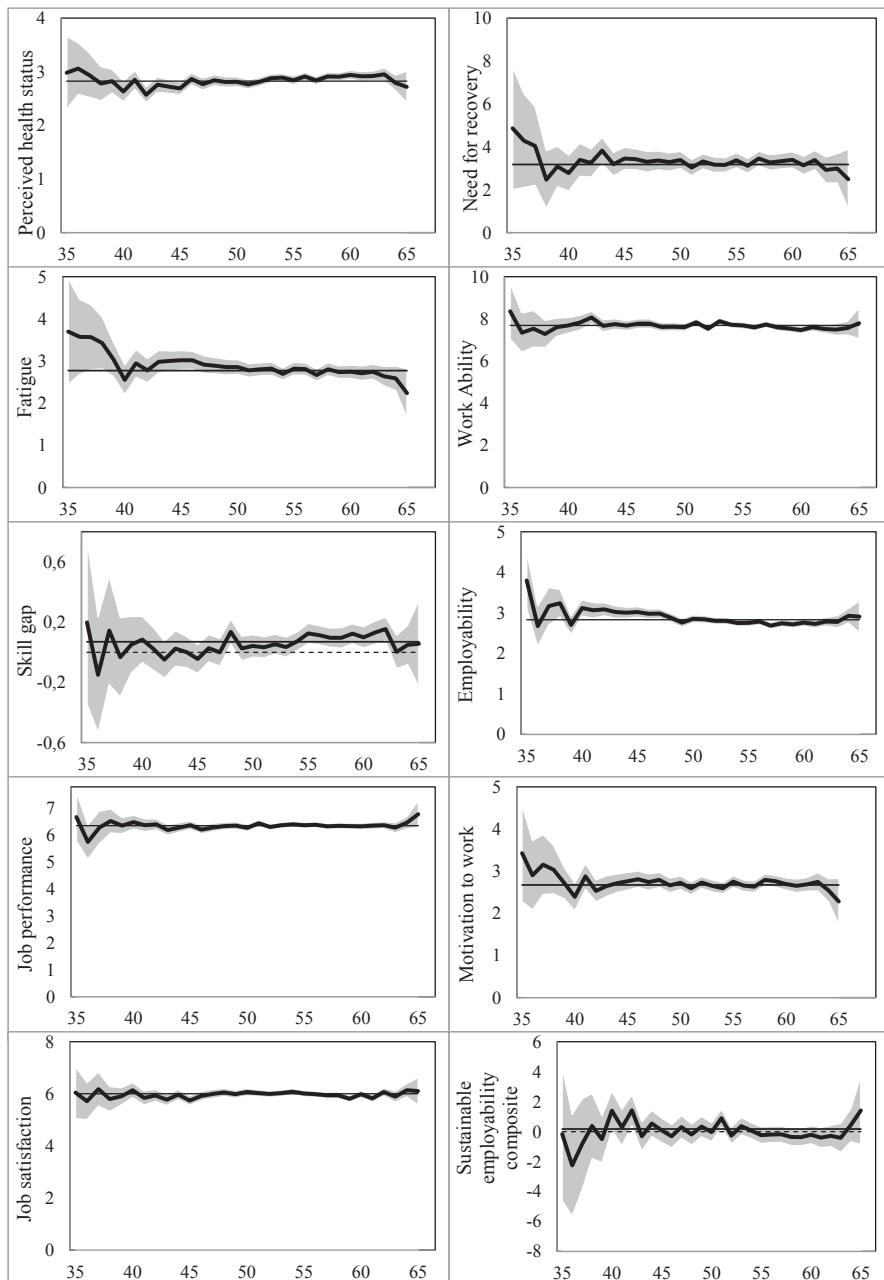


Figure 5.1. Estimated marginal means of sustainable employability and each of its dimensions (vertical axis) for all age groups (horizontal axis; in 1 year categories), including 95% confidence intervals, overall mean line (straight), and zero-line (dashed).

time significantly affected fatigue ($\beta=0.09, t(2, 579)=3.20, p<0.001, 95\% \text{ CI } 0.035-0.145$), job performance ($\beta=0.084, t(2, 475)=3.31, p=0.001, 95\% \text{ CI } 0.034-0.134$), and skill gap ($\beta=0.093, t(2, 454)=6.44, p<0.001, 95\% \text{ CI } 0.064-0.121$). The overall SE construct was not affected significantly by time of measurement. Table 5.2 provides an overview of results regarding overall significance tests of age and time effects on SE and its dimensions. Second, the repeated measures ANOVAs revealed that the within-between subjects variance ratios differed per dimension of SE. For all dimensions and SE itself, most variance exists between (61.4% - 85.0%) rather than within (15.0% - 38.6%) subjects (Table 5.3).

The supplemental analyses revealed similar patterns for the available dimensions (i.e. perceived health status, need for recovery, and fatigue) of SE in earlier waves of the MCS. Additionally, drop-out of participants from the cohort was only minimally related to age but not to health. That is, from the first (1998) to the third (1999) wave of the MCS a relatively larger number of mainly young participants (age group 18 to 25) chose to no longer participate in subsequent waves. However, in subsequent waves no further age-related drop-out was observed. Finally, the multilevel regressions with mild and heavier physical functioning impairments as dependent variables revealed that mild physical functioning impairments were related to age and heavy physical functioning impairments were not. For parsimonious reporting, specific results of these supplemental analyses are not reported here but can be requested from the corresponding author.

Discussion

The present paper aims to explore the relationship between age and sustainable employability (SE) while correcting for potential time effects. In line with previous literature on age as a predictor of functioning in work, we show that SE is only marginally affected by age. Specifically, only two SE dimensions (i.e. perceived health status and employability) demonstrate significant, albeit small associations with age. Additionally, we find time effects on three SE dimensions (i.e. fatigue, job performance and skill gap). Moreover, a substantial amount of within-subjects variance is observed in SE's dimensions over a timespan of two years, with differing within-between subjects variance ratios across dimensions. These findings suggest that it is feasible to consider SE as a time dependent construct in which sustainability is captured as development over time (cf. Fleuren et al., 2015). Additionally, the prominent role ascribed to age in SE research may require reconsideration.

Limitations

A first potential limitation to the present study concerns generalizability. Although the sample includes employees with a large variety of job titles, employees facing the highest category of physical demands as part of their job are underrepresented. That is, only two employees in the sample could be considered to belong to this category. Therefore, our findings may not generalize to this specific group of employees (e.g. those in the building trade), who are at higher risk of early labor market withdrawal (Sell et al., 2009). Nonetheless, based on job type the sample in this study does seem representative for at least 80% (CBS, 2017b) to 98% (Koning & Meuwese, 2017) of the Dutch employees who do not work under the highest physical demands. Similarly, our findings may arguably not generalize to the self-employed (about 16.6% of the Dutch working population; (CBS, 2017a)) or those working in small businesses (about 34% of the Dutch working population; (Chong, van Beveren, Verbiest, & van der Wal, 2016)). However, as the actual job demands self-employed and small business employees face are not necessarily different from those of employees employed in larger organizations. Relatedly, the findings may not generalize to people with multiple jobs as these were excluded from our sample. However, the exclusion of this group is not likely to have impacted our findings as they constituted only a small part of the initial sample. Still, future studies should look into age and time effects on sustainable employability for these specific groups.

A second potential limitation lies in the reliance on self-report measures. When completing self-report measures on, for example performance and health, employees may use their same age peers as reference points (Robinson-Whelen & Kiecolt-Glaser, 1997). This potential comparison to others could result in slightly biased findings. However, there is no way of estimating the magnitude of this bias, no viable alternatives to self-report questionnaires for studying the complex topic of SE in field settings are currently available, and the approach of using self-report questionnaires is common practice. Relatedly, since the study uses existing data, two of the measures used (i.e. motivation to work and job satisfaction) are not ideal. That is, the measures for these constructs are commonly used to measure general motivation to engage in activities and work engagement respectively. This general motivation could be a proxy for motivation to work (i.e. working is a core activity in most working individuals' lives), but is not a perfect measure. Similarly, the work engagement items used to capture job satisfaction do measure a general appreciation individuals have for their work, but not job satisfaction itself in full specificity. However, no alternative measures for these constructs were available

in the dataset and no other datasets with superior measures and an equally good sample could be identified. As such, we deemed it better to use these proxies for motivation to work and job satisfaction than to not include these dimensions at all. Nonetheless, future research on SE might benefit from developing alternatives to self-report data and use measures that target all SE's dimensions with full specificity.

Third, the present study's scope is entirely on age and time effects. Although many candidates may exist, the study does not report on any explanatory variables or alternative predictors. For example, chronic diseases might explain part of the age effects found in this study (Brouwer et al., 2012). Similarly, education level, socio-economic status and several other variables could predict SE. This study did deliberately not include such variables, because age is so strongly assumed to be so important in the context of SE that it requires a separate treatise. Additionally, including such variables would not affect the main conclusion of our article (i.e. age is not as important as assumed), as they would only reduce the variance that age could explain (i.e. age effects would be even smaller). Finally, age and time are givens and unchangeable, and thus, precede – or at least coincide with – any other variable in causal chains in the context of SE. By teasing these two effects apart without including other potential covariates, the present paper may pave the way for future studies on other predictors of SE and their potential interactions with age.

Finally, some caution is advised in interpreting this study's findings for three reasons. First, absence of evidence does not equal evidence of absence. Although we find only limited effects of age on SE, we do not intend to contend that age is (nearly) irrelevant in the context of SE (e.g. age may still be an important moderator of other employment characteristics). Still, it should be noted that, if anything, our analyses left plenty of room for age effects to emerge (i.e. we could have controlled for correlation among dependents to reduce the age effects further and we liberally used age as a categorical variable). Thus we can conclude that, in our sample, age effects are minor indeed. Nonetheless, it remains impossible to *prove* that something – here age effects on SE in particular – does not exist. Second, our findings could arguably be biased by selection effects. We examined this by estimating age and time effects both for the available (predominantly health-based) constructs in earlier waves of the MCS and for general and severe physical functioning impairments in the current waves, as well as by considering age, health and employment status related attrition. As we find similar patterns in earlier waves, the expected general – but not severe – physical functioning impairments with age, and no indications of age, health, or

employment status related attrition, these auxiliary analysis give no indication of selection effects. Moreover, based on the large variety of employees from various organizations across multiple sectors in our sample, it seems representative for Dutch employees (except for those in highly physically demanding jobs, and, arguably, those who are self-employed or working in small businesses). Third, one could argue that our study should include more measurement waves covering a larger timespan. This might indeed be favorable, but would mainly increase the likelihood of finding time – and not age – effects on SE. In conclusion, we advise some caution when interpreting our finding that age has only limited effects on SE, but given the aforementioned considerations we deem it unlikely that in a larger population more pronounced (direct) age effects would emerge. Nonetheless, we encourage other researchers to replicate our findings to see if age remains a modest predictor of SE in different samples covering larger timespans.

Implications

First, our findings imply that the focus on older employees as being less capable to function at work in the context of SE does not seem justified. As only two of SE's dimensions are significantly affected by age, these two effects are small, and the overall construct of SE is not significantly affected by age, older employees do not seem less able to function at work and on the labor market. This echoes ideas from previous studies that document minor, no, or positive relationships between age and functioning at work (Le Blanc, van der Heijden, & van Vuuren, 2017; McEvoy & Cascio, 1989; Ng & Feldman, 2008; Waldman & Avolio, 1986). Perhaps the notion that older employees would be less able to function at work or on the labor market is merely based on existing stereotypes indeed (Posthuma & Campion, 2009), or meaningful declines in work-relevant characteristics only begin once people stop using them (e.g. after retirement) (Hertzog, Kramer, Wilson, & Lindenberger, 2008; Mazzonna & Peracchi, 2012). Alternatively, our findings may suggest that despite cognitive and physical declines in some areas, older employees have excellent compensation strategies or their jobs are well adjusted to their needs and abilities (Abraham & Hansson, 1995; Kooij, Tims, & Kanfer, 2015). Either way, our findings seem to suggest that the attention SE research and policy have directed to mainly older employees is not proportional. Instead, SE should be considered as an affair that is relevant across the lifespan (Fleuren et al., 2015; van der Klink et al., 2016) and this message should be communicated to policy makers, managers, and HR professionals. Moreover, it seems advisable to offer HRM practices regardless of age (Veth, Korzilius, van der Heijden, Emans, & de Lange, 2017), and, appreciating

the variance within age groups, to design them to match individual employees' needs rather than the stereotypical needs of certain age groups.

Second, our findings suggest that modeling SE as a time-dependent construct is viable. Fleuren et al. propose that the sustainability component of SE can be modeled as development in SE and its dimensions over time (Fleuren et al., 2015). However, if no within-person variation over time would exist or if SE would be largely or completely determined by age, considering developmental trajectories would make little sense. By demonstrating that age only plays a minor role in the context of SE and SE's dimensions exhibit substantial variation over time (changes occur over a period as short as two years), we show that this approach to SE is feasible. Relatedly, the differences in development and the extent to which each SE dimension is affected by age reconfirm SE's nature as a formative construct (Fleuren et al., 2018). Therefore, in addition to the message that SE does not strongly decline with age, our findings suggest that recent developments in conceptualizing SE are promising.

Finally, the time effects in this study may point to the effects of the financial crisis that started in 2008 and their backlash on employees and the labor market. As the data used in our study were collected in 2012 and 2014 respectively and we find concurrent overall increases in fatigue, skill-gap and job performance, our findings may reflect an impact of the financial crisis on employees. These overall increases could point to employees having to work harder, potentially to secure their job (i.e. on average performance but also fatigue increases), while having reduced access to development opportunities (i.e. on average skill gap increases). Alternative explanations of these time effects might be relevant as well, such as a requirement for people to remain working while being diagnosed with a chronic disease (Boot et al., 2013). However, if because of a structural change, a larger percentage of the working population would consist of people with chronic diseases, one would expect average health and functioning scores to differ structurally before and after the change. In our study, we did not find such time effects on most health variables, so the requirement to work longer with chronic diseases is a less plausible explanation of our findings.

Conclusion

In conclusion, this paper contributes to the literature by providing insights in age- and time effects on SE. By identifying only modest age effects and substantial variation in SE and its dimensions over two time points, the paper demonstrates the feasibility of modeling SE as the inherently time-dependent construct it is. Moreover, these fundamental insights in the age-time-SE relationships loosen the firm grip the age-issue has kept on SE research. Thereby, this paper may contribute to countering the negative stereotyping of older employees as well as form a prerequisite for more practice oriented research on dynamic employment characteristics as predictors of SE. After all, the main goal of SE research is to identify work and work-contextual factors that may facilitate people in participating in employment longer in a beneficial way.

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Chapter 6

Sustainable
employability of
healthcare employees

EMBARGOED

This chapter is based on: Fleuren, B. P. I., Zijlstra, F. R. H., de Grip, A., & Kant, I. We need to slow down: A two-wave observational study on intersectoral differences in- and the predictors of healthcare employees' sustainable employability (Manuscript in preparation).

Chapter 7

General discussion

This dissertation aims to answer the central research question of how the sustainable employability of healthcare employees can be conceptualized, measured, and predicted. The purpose of gaining insight into these topics is to facilitate healthcare employees' ability to work longer in a healthy, happy, and productive way. This is most relevant as it is imperative to maximize the labor participation of healthcare employees, particularly in light of population aging. At the same time, attaining healthily extended working lives for healthcare employees is complicated as they work in a constantly changing environment. This complex interplay of changes in several aspects of society makes the central research question of this dissertation both complex and relevant. This final chapter reflects on this dissertation's main conclusions, their validity and implications, and provides directions for future research. Thereby, it suggest that although several aspects of this dissertation and the context in which it was completed should be considered carefully, it may provide important first steps in addressing both sustainable employability in general and among healthcare employees.

Main conclusions

The general introduction delineates several conceptual and methodological steps that should be taken to predict sustainable employability in general and for healthcare employees specifically. These steps range from handling the current state of the field of sustainable employability (i.e. characterized by a lack of conceptual clarity), to creating conceptual clarity, establishing a valid (measurement) approach, and consequently appropriately addressing sustainable employability as an integrative longitudinal concept. These steps each form the basis of Chapters 2 to 5, so that Chapter 6 can identify predictors in healthcare employees' employment context that contribute to sustainable employability. The remainder of this section discusses the conclusions that were taken at each step (and as such in each consecutive chapter), to provide an overview of the main conclusions of this dissertation.

The first step in answering the central research question of this dissertation relates to overcoming the novelty of the field and the consequent lack of a comprehensive conceptual framework for sustainable employability. To take this first step, Chapter 2 analyzes the currently leading (i.e., the by far most cited) definition by van der Klink et al. (2016) and formulates several guidelines to achieve a clear conceptualization of sustainable employability. As mentioned in the chapter, a sound conceptualization should clearly label aspects of an employment situation that constitute sustainable employability, explicitly separate causes and effects, treat sustainable employability

as an individual characteristic that may be predicted by other employment characteristics, apply the concept to all individuals regardless of employment status, and clearly address the inherently longitudinal nature of sustainable employability. These guidelines may offer elaborate input for a comprehensive conceptualization.

The second step is to achieve an adequate conceptualization of sustainable employability based on the guidelines provided in Chapter 2. Chapter 3 addresses this issue by analyzing and conceptualizing the constituents ‘sustainability’ and ‘employability’ separately. Here, employability is conceptualized as an individual’s ability to function at work and in the labor market as consisting of a diverse set of nine individual level indicators in the health, well-being, and competence domains. These nine indicators included in this broad conceptualization of employability are based on previous studies on both sustainable employability and employability in general, taking a multi-disciplinary perspective (i.e., combining insights from work and organizational psychology, occupational epidemiology, and labor economics) on what constitutes functioning in an employment context. Sustainability is then conceptualized as stability or growth (i.e., absence of declines) in this broad employability construct in relation to the way individuals are employed. Taken together, this allows for capturing sustainable employability as the development in its nine dimensions over time. This development can then be connected to various aspects of an employment situation, so that the relevant predictors of sustainable employability can be identified. As depicted in the conceptual model in Chapter 3, this approach also clarifies the notions of sustainable employment, sustainable work, and sustainable work ability.

Chapter 4 addresses the third step that focuses on the validity of sustainable employability as a construct. That is, the validity of the conceptualization provided in Chapter 3 depends on the extent to which sustainable employability can be validly captured as a combination of its nine indicators (cf. Cronbach & Meehl, 1955). With a complex construct like sustainable employability the key question relating to its construct validity is then whether the construct constitutes a reflective or a formative construct (e.g., Diamantopoulos & Winklhofer, 2001). Where relatively straightforward validity assessment approaches (i.e., factor analysis) are available for the former, establishing construct validity is most complicated for the latter (e.g., Bollen & Diamantopoulos, 2017; Diamantopoulos & Siguaw, 2006; Edwards, 2011). Building on a checklist for identifying the nature of a construct developed by Jarvis, MacKenzie, and Podsakoff (2003), Chapter 4 formulates a

checklist as well as guidelines for using structural equation modeling to achieve an indication of the validity of a formative construct. This approach is then applied to sustainable employability, identifying it as a formative construct. Using data from the Maastricht Cohort Study (MCS) (Kant et al., 2003; Mohren, Jansen, van Amelsvoort, & Kant, 2007), the validity of this formative construct is then evaluated in a series of structural equation models. The main conclusion here is that the formative construct of sustainable employability can be validly captured as far as can be assessed.

The fourth step relates to the conceptualization of sustainable employability as an inherently time dependent construct. That is, as sustainable employability is captured as the development in the ability to function at work and in the labor market, both age and time effects might play an important role. Specifically, if all development in sustainable employability is due to individuals growing older, there is little point in designing interventions to promote it. Additionally, an assumption in existing research (e.g., Brouwer et al., 2012) is that sustainable employability is particularly problematic among older employees. Given the limited and mixed evidence for this assumption, Chapter 5 aims to investigate the extent to which sustainable employability is affected by age, while controlling for potential time effects that are known to be a potentially relevant confounder (e.g., O'Brien, 2000). Using data from the MCS (Kant et al., 2003; Mohren et al., 2007), Chapter 5 shows that age effects on sustainable employability are in fact very limited. Consequently, Chapter 5 concludes that sustainable employability can be captured meaningfully in terms of development over time. Therefore, the focus on age as factor in sustainable employability requires reconsideration.

After taking these important conceptual and methodological steps, Chapter 6 turns to the sustainable employability of healthcare employees. Using data from the MCS (Kant et al., 2003; Mohren et al., 2007), Chapter 6 first considers the extent to which healthcare employees' sustainable employability develops differently over time than that of individuals working in other sectors. The analyses mainly show that healthcare employees' sustainable employability and its separate indicators show a more negative development over a period of two years than that of employees working in industry and in the financial sector. Given these intersectoral differences, a sector specific approach seems warranted and the sustainable employability of healthcare employees might indeed deserve extra attention. Building on this first conclusion, Chapter 6 then considers predictors of the sustainable employability of healthcare

employees specifically. The analyses show that task variety and organizational tenure contribute to employees' overall sustainable employability and that being personally attacked or threatened during work harms it. Additionally, considering the separate indicators, negative effects are found for negative social interactions at work, positive effects are found for job autonomy, and mixed effects are found for working time arrangements and human resource development practices. Specifically, regarding the latter finding, healthcare employees' health-based indicators of sustainable employability develops negatively when their organization offers opportunities for professional development, while their perceived employability does increase. This demonstrates that development oriented HR practices may have negative side effects on employees' health. These findings provide healthcare organizations with potential ways and considerations for promoting the sustainable employability of their employees.

Internal validity

This dissertation's logical stepwise approach in answering the research question seems to contribute to part of its internal validity. That is, the separate chapters build on each other and no contradictory findings emerge. Specifically, the suggestions for a novel conceptualization in Chapter 2 are completely addressed by the conceptualization as formulated in Chapter 3. Moreover, the combination of separate indicators for sustainable employability as proposed in Chapter 3 is corroborated by the validation in Chapter 4. Additionally, the limited age effects in Chapter 5, contribute to the confidence in the conceptual model as proposed in Chapter 3. Relatedly, the differences in age and time effects per indicator of sustainable employability in Chapter 5, but also the intersectoral differences in development per indicator in Chapter 6, reiterate sustainable employability's formative nature as identified in Chapter 4. Furthermore, Chapter 6 reveals equally limited age effects as Chapter 5, even without controlling for potential time effects. Finally, the findings in Chapter 6 with regard to antecedents of sustainable employability match reasonably well with the findings as described in the explorative study described in the general introduction of this dissertation. This again supports the conceptualization of sustainable employability as predicted by a broad array of potential employment characteristics in Chapter 3. In sum, the findings of the separate chapters paint a gradational and consistent picture with regard to sustainable employability.

Besides the internal consistency of the dissertation, internal validity pertains to the possibility of causal inference of findings and the quality of design (e.g., Campbell, 1986; Grimes & Schulz, 2002; Hernàn, 2018; Loewenstein, 1999). Although this dissertation's empirical chapters rely on observational data (i.e., the MCS) rather than experimental data, there seem to be reasonable grounds for at least some findings to be meaningfully interpreted as causal. That is, causal inference requires three conditions to be met: i) what is conceptualized as the predictor temporally precedes the outcome; ii) the predictor and outcome vary together; and iii) there are no viable alternative explanations for the covariation of the predictor and the outcome (e.g., Pearl & Verma, 1995; Shadish, Cook, & Campbell, 2002). This latter condition also pertains to the quality of the design of studies that do not claim causality. As such these three conditions form a sound framework for evaluating the empirical findings in this dissertation. In the remainder of this section the empirical findings in Chapters 4 to 6 are discussed using these three conditions as criteria.

Temporal precedence

The empirical findings in this dissertation that suggest causality (i.e. Chapters 5 and 6) all seem to fulfill the first requirement of temporal precedence. Importantly, the criterion of temporal precedence does not pertain to Chapters 2 to 4, as these focus on the conceptualization and measurement of sustainable employability and do not make any causal claims. Both Chapters 5 and 6, however, constitute studies on change in sustainable employability and its indicators with two measurement occasions, which allows for appropriate temporal positioning of predictors and outcomes. In Chapter 5, this manifests itself in the notion that the age and time effects on change in sustainable employability are 'fixed givens' in the sense that someone inherently has a certain age and that something is by default measured at a specific time point. As such, these two predictors only make sense as the first steps in any causal chain aimed at explaining change in sustainable employability. In Chapter 6, variables that constitute predictors are measured at the first measurement occasion, and their effects on sustainable employability are deliberately controlled for the sustainable employability scores at this first measurement occasion as well. As such, the temporal precedence criterion does not seem to be violated.

Correlation

This dissertation's empirical findings seem to satisfy the second criterion of correlation. That is, the findings in all three empirical chapters are based on correlational patterns. In Chapter 4 the integrity of the measurement model for

sustainable employability is evaluated based on correlational patterns. Although there is no claim of real causality here, the chapter only interprets significant correlations as meaningful. Similarly, Chapters 5 and 6 also employ regression techniques to identify correlational patterns. Both chapters only interpret those relationships that are identified as significant. As such, it can be concluded that all inferences based on the empirical chapters do not violate the requirement of correlation.

Alternative explanations

For observational research in general, the third criterion (i.e., lack of alternative explanations) is the most complicated. That is, there can be various factors determining the extent to which findings in observational studies are affected by the aspects of a study. As the empirical chapters of this dissertation all use observational (i.e. non-experimental) designs, this aspect should be considered most elaborately. The next paragraphs of this section reflect on the extent to which each of the three most relevant potential threats may affect the internal validity of this dissertation's inferences.

Perhaps the most relevant alternative explanation regarding the findings in this dissertation is selection bias. Selection bias means that for some (out of several possible) reasons, participants in the sample constitute a particular type of participant. This 'typeness' might then constitute a relevant plausible explanation for (part of) the effects found in a study. Considering the data from the MCS as used in this dissertation, selection bias may affect the internal validity in two ways. First, the participants who are included in the later waves of the MCS (i.e., the 2012 and 2014 measurement occasions used in the empirical chapters) could constitute a specific subsample of initial respondents (i.e., selective attrition). Although this would be more of a threat to the external validity (i.e. representativeness of the sample), it may be relevant to some of the relationships considered in this dissertation as well. That is, for functioning related variables, selective drop-out might lead to a sample of employees whose higher health-status could buffer potential negative effects of working conditions on health (cf. Ceschi, Fraccaroli, Constantini, & Sartori, 2017). However, Based on auxiliary analysis performed for Chapter 5, this type of selection effect does not seem to be present to a meaningful extent, as the sample does not seem to be healthier than usual, nor is there evidence for meaningful selective drop-out on relevant variables. Second, when estimating the effects of specific employment characteristics on sustainable employability, exposure to such

characteristics could be determined by (self-)selection as well. This is particularly relevant to the effects of working time arrangements as discussed in Chapter 6. That is, employees who work under a certain working time regime typically do so by choice. Consequently, the ratio of employees for which working under a specific regime is beneficial is higher than in the population (i.e. they choose to do it for specific reasons or they stay in it because it works for them (e.g., Kristensen, 1989; Mohren et al., 2007)). This could then lead to a potential overestimation or even reversal of the actual effect, due to a healthy worker effect (e.g., Arrighi & Herz-Pannier, 1994; Li & Sung, 1999). Chapter 6 therefore urges caution in interpreting the effects of working time arrangements on sustainable employability. However, for the effects of other characteristics or predictors in Chapters 5 and 6 there seems to be no evidence for a particular selection effect. Still, caution and replication are always advised.

A second potential alternative explanation that might threaten the internal validity of this dissertation's findings is confounding. That is, in any observational field study, it is difficult to control (for) all factors that might be relevant to a specific outcome or relationship among variables (Grimes & Schulz, 2002). This might apply to the findings in Chapters 5 and 6 in particular. For Chapter 5, however, it is unlikely that the effects of age and time on sustainable employability are meaningfully confounded by other variables. That is, as mentioned, age and time are givens in a situation for which it is most relevant to estimate them while controlling for each other. Additionally, Chapter 5's relevance mainly lies in identifying an absence of age effects and it does not seem likely that, when controlling for other variables, age effects would be substantially magnified. One possible meaningful confounder of the age and time effects might be a cohort effect (e.g., O'Brien, 2000; Smith, 2008). However, this effect is, as argued in Chapter 5, less relevant to consider in the context of sustainable employability, as it does not threaten the validity of the conceptual model. Additionally, it would be mathematically impossible to estimate a model containing age, time as well as cohort effects (e.g., Bell & Jones, 2013). The extent to which the findings in Chapter 6 should be controlled for an unknown confounder also seems limited. That is, the models in Chapter 6 already include a wide array of employment characteristics as predictors in various domains. Consequently, there do not seem to be any specific theoretically relevant potential confounders that would significantly magnify, reduce or obliterate the effects found. As such, the extent to which confounding affects the internal validity of this dissertation seems limited.

A potential third alternative explanation that might threaten the internal validity of this dissertation's findings could lie in self-report bias. That is, the quality of instruments used is an important factor determining the internal validity (Grimes & Schulz, 2002). In this dissertation, validated measures are used to capture sustainable employability and its separate indicators. However, all of these instruments constitute self-report measures. Although the measures are considered valid, the specific scores participants obtain on them could be affected by self-report bias. For example, personality traits (Austin, Deary, Gibson, McGregor, & Dent, 1998) and age (Robinson-Whelen & Kiecolt-Glaser, 1997) are known to potentially influence how people perceive their own and their environment's characteristics and report them. Although there are no specific reasons to assume that self-report bias affects the results in the dissertation, the options for checking whether it is an issue are limited. Importantly, however, previous studies using MCS data in combination with data from medical records suggest that self-report bias for the health-based measurements in the MCS seems limited (Szerencsi, van Amelsvoort, Prins, & Kant, 2013). Moreover, the potentially related issue of common method bias (i.e. biased estimates due to using the same measurement approach – here: self-report – for variables in a study) does not seem to affect this dissertation's findings because of the temporal separation of outcome and predictor (Podsakoff, MacKenzie, & Podsakoff, 2012). Still, as self-report bias cannot be ruled out completely, any interpretations of this dissertation's findings take into account this potential source of bias. Importantly, this potential bias could not be avoided, as no viable alternative measures for sustainable employability currently exist. As such, it may be beneficial to develop such alternatives in future studies.

External validity

An important first reflection on the external validity of this dissertation is that three of the chapters rely on data gathered in the same study and sample. That is, Chapters 4, 5 and 6 all use data from the Maastricht Cohort Study (MCS). As such, it is important to consider the extent to which the findings in these chapters – and thus this dissertation as a whole – would generalize to other samples and the (Dutch) population. As elaborated on by Mohren et al. (2007), the MCS provides a reasonably representative sample of the Dutch working population, with some exceptions. That is, people working in forestry, fishing, and hunting, or in curative care are not represented in the cohort. Additionally, only employees from organizations with more than 100 employees participated in the study (Mohren et al., 2007). Moreover, temporary employees and non-Dutch employees were also

not included in the sample. This means that the extent to which findings generalize to employees working in the aforementioned sectors, in small organizations, and with temporary contracts remains uncertain. Similarly, differences among Dutch employees with a different cultural background (e.g. migrant workers) that might exist with respect to the studied variables and relationships could also not be taken into account. Nonetheless, the MCS constitutes a relatively large sample that is representative for the majority of the Dutch working population. Moreover, most of the structural relationships studied concern mechanisms that, given a similar societal context, could be considered general mechanisms. Still, it would be beneficial if future studies would consider and replicate the findings in other samples.

A second consideration regarding external validity concerns the aspects of time and place. As hinted on by the title of this dissertation (i.e., ‘Caught somewhere in time’), it is important to consider the timeframe and societal context in which the dissertation was written. That is, the findings are based on employees working in the Netherlands in the years 2012 and 2014. Where for some fundamental studies context may be less relevant (e.g., studies on brain functions), it must be noted that research on employment and employability takes place within a labor market in a specific society where specific regulations may apply at a given point in time. As briefly discussed in the general introduction, changes in for example regulations, labor market demands, or the workforce, might determine employee outcomes. Compare for example the current extent to which working hours are formally regulated and informally implemented in the Netherlands with Japan. In the Netherlands working hours are well-protected and meaningfully lower, whereas in Japan long working hours and even dead by overwork remain important issues (Iwasaki, Takahashi, & Nakata, 2006; Kondo & Oh, 2010). Similarly, the demand for low-skilled work was much higher in the Dutch labor market of 1970s than it is now, with obvious implications on employment opportunities (P. de Beer, van der Meer, van Ruysseveldt, & Wielers, 2006). Relatedly, the fact that sustainable employability can be considered a European topic (i.e., as evidenced by the country of origin of most authors in the field) can probably be explained by the fact that retirement is at least partially state-funded in most European countries. Similarly, the costs of sickness based work incapacity are paid for by society in for example the Netherlands, rather than by employers as is the case in the US. These differences in social security determine both the extent to which sustainable employability is high on political and organizational agenda’s as well as the context in which it develops and is observed. Therefore, it is paramount

to acknowledge that researchers working on, but also people participating in, studies on sustainable employability are immanently prisoners of their societal and temporal context.

Implications

This dissertation's findings have important general implications for various societal and scientific debates. The first general implication centers on this dissertation's potential contributions to societal debates on employment and social security. That is, this dissertation could contribute to the important societal debates on 'heavy occupations' in the Netherlands (e.g., Klijnsma, 2017) or 'arduous occupations' in the whole of Europe (Natali, Spasova, & Vanhercke, 2016). Specifically, just as sustainable employability is considered a social construct, the notion of a heavy occupation is likely a social construct. Recognizing the concept as such could then arguably facilitate defining heavy occupations based on insights into how working in specific occupations affects employees' sustainable employability. For example, if the employability of a certain occupational group systematically declines as time progresses, this could be a criterion on which to classify that occupation as heavy/arduous, especially when opportunities to transfer to meaningful work in a later career stage are limited. Importantly, it is arguably better to adjust working conditions in potential heavy occupations – in as far as possible – to foster decent work for all (UN, 2015) and the framework this dissertation provides might help in doing so. Relatedly, this dissertation may be informative for the debate of extending working lives, as it suggests that age effects on sustainable employability are only minor (Chapter 5). However, the dissertation also shows that variation in sustainable employability exists mainly between people (Chapter 5). As such, the ideas for connecting the retirement age to healthy life expectancy or education level (cf. J. de Beer & van der Gaag, 2018) would probably lead to unfair situations on the individual level. That is, although on average people of a certain education level or healthy life expectancy may have a certain number years to enjoy their retirement years, the between person differences in sustainable employability suggest that these group level statistics cannot be applied to individual cases in a fair way. Finally, the fact that sustainable employability is determined by factors in the work and work context reiterates the responsibility employers have in safeguarding it (cf. van der Klink et al., 2016). Consequently, employees should not bear the full responsibility themselves and it could be instrumental to secure this notion in policies.

A second essential implication of this dissertation is that it may provide a framework for future research on sustainable employability. Particularly the conceptual model as presented in Chapter 3 is most relevant in structuring future research. That is, this model succeeds in giving meaning to all (or at the very least most) components that have been forwarded as relevant in existing studies on sustainable employability. Specifically, the model seems to adequately explicate and operationalize sustainable employability's longitudinal component, distinguish between outcomes and antecedents, position related concepts (i.e. sustainable employment, sustainable work, and sustainable workability), and include agreed upon indicators of sustainable employability. Consequently, the model does not only allow for positioning existing studies on sustainable employability, it also provides a clear means of structuring future studies and demarcating the field. The latter is particularly important, as the adjective 'sustainable' is currently used ubiquitously and typically without concern for its specific meaning. As such, concepts incorporating the term 'sustainable' are at high risk of inflation. The specific and comprehensive conceptual framework as offered in this dissertation has the potential to make sustainable employability a meaningful addition to the large variety of concepts that already exist in occupational health research.

As a third implication this dissertation as a whole might help in handling the complexity of the capability approach as proposed in the leading definition of sustainable employability. That is, as argued in the Chapters 2 and 3, the capabilities that are considered by Abma et al. (2016) and van der Klink et al. (2016) to be indicators of sustainable employability, should actually be considered predictors. Besides making this point conceptually, this dissertation shows in Chapter 6 that some aspects (i.e. task variety and job autonomy) that could constitute meaningful work (Both-Nwabuwe, Dijkstra, & Beersma, 2017), and thus (partially) reflect capabilities, can indeed be understood as positive predictors of change in sustainable employability. Although this relates to the first implication, this particular finding is relevant in itself, as it potentially provides much needed clarity in the field of sustainable employability.

Fourth, this dissertation implies that sustainable employability should be recognized explicitly as a social construct. That is, as hinted on in Chapter 1 and shown by identifying it as a formative construct (Chapter 4), sustainable employability should not be treated as something that exists as a real entity. Rather, sustainable employability is a construct invented to address the need for successfully

extended working lives. This realization is crucial, because it implies that sustainable employability as a construct does not have any causal potency in itself (Borsboom, Mellenbergh, & van Heerden, 2003, 2004; Gruijters, 2017; Gruijters & Fleuren, 2018). Instead, in predicting, for example, actual employment status as outcome of sustainable employability, causal inferences can only be made at the separate indicator level. Similarly, interventions aiming to improve sustainable employability should probably best target its nine separate indicators (cf. Bollen & Diamantopoulos, 2017). Importantly, recognizing sustainable employability's formative nature does not imply that the aggregate construct has no value. Instead, the concept of sustainable employability exists to address real societal questions and issues (i.e. the complex interplay of demographic developments and changes in the nature of work) which stem from social and political developments themselves and are too complex to be tackled with unidimensional approaches. In that sense, the definition and context dependency of sustainable employability as a social construct only matches the intrinsic contextual dependency and complexity of the issues it addresses. Specifically, the sustainable employability composite provides an integral approach to individuals' occupational health, which it necessary to comprehensively cover functioning at work or in the labor market. For example, the sustainable employability composite can capture potential compensation effects that would not be identified by looking at its indicators separately; i.e., a decrease in employability may be accompanied by an increase in health, thus potentially safeguarding an individual's ability to function. Finally, recognizing sustainable employability as an inherently formative construct also means that approaches aiming to capture it cannot claim validity based on an overall factor analysis (Diamantopoulos, Riefler, & Roth, 2008; Law & Wong, 1999). Instead, doing so might lead to a false sense of security regarding the validity of the measurement instruments used. As argued in Chapter 4, this implication may generalize to other constructs in the occupational health literature.

The fifth key implication of this dissertation's findings relates to the limited effects of age on employees' sustainable employability as found in Chapter 5. That is, as discussed in Chapters 1 and 5, there seems to be a relatively persistent focus on age as an important factor in sustainable employability research (e.g., Brouwer et al., 2012). This is most understandable given the recent societal developments regarding the abolishment of early retirement schemes and increases in the retirement benefits eligibility age (Koolmees, 2017). That is, these developments are particularly salient to older employees, who are most immediately affected by

these developments. However, the focus on age might also suggest that sustainable employability is particularly a difficult issue among older employees (Brouwer et al., 2012). Additionally, it relates to a somewhat persistent belief among employers that older workers function less well (Posthuma & Campion, 2009). By demonstrating that there are only very limited age effects while controlling for time effects, Chapter 5 might reduce age stereotyping in the field of sustainable employability. Moreover, these findings might loosen the grip age has on sustainable employability research, allowing researchers to move on to a true lifespan approach. Additionally, these findings stress that from this perspective there is little justification for age-biased decisions regarding employment and development opportunity allocation (Hedge, Borman, & Lammlein, 2006). Finally, these findings might also suggest that rather than an age-focus in facilitating sustainable employability, an individual focus approach should be used. Of course, age might still be a relevant moderator of the effects of other employment characteristics and replication of these findings is essential.

Finally, implications from Chapter 6 relate to the relevance of intersectoral differences as well as directions for healthcare organizations in promoting sustainable employability. First, the intersectoral differences found in this chapter might suggest that the healthcare sector deserves extra attention with regard to promoting sustainable employability. That is, in line with findings from Dutch Central Bureau of Statistics (CBS, 2016, 2018), negative developments in sustainable employability are more pertinent in the healthcare sector than in the other larger sectors (i.e., the industrial and financial sectors) in the sample. Additionally, as there are also intersectoral differences in the development of the specific indicators of sustainable employability, Chapter 6 might provide insights into which components are particularly at risk in healthcare. In any case, these findings reiterate the relevance of considering sectors in the context of sustainable employability (de Grip, van Loo, & Sanders, 2004). Second, with regard to promoting sustainable employability among healthcare employees, several aspects are identified as important. In light of the critical considerations regarding the findings on working time arrangements, it seems that to promote sustainable employability, healthcare organizations should particularly target the social aspect of working, as well as creating meaningful (i.e. varied and autonomous) jobs. Additionally, healthcare organizations should be mindful of the potential negative side effects of making development oriented HR practices available to employees. Although such practices may be beneficial in promoting employability, they

seem to have negative implications on health. This may be particularly important in healthcare, where such practices may only add to the already high demands healthcare employees typically face.

Directions for future research

Following the aforementioned reflections on external validity, an important direction for future research on sustainable employability lies in replication (cf. Tsang & Kwan, 1999). As noted in Chapter 1, research on sustainable employability still finds itself in an early stage. Consequently, replications of this dissertation's findings as well as other studies in the field are necessary. The comprehensive conceptual framework developed in this dissertation (Chapter 3) may guide such endeavors as it unifies existing approaches to sustainable employability. Now the road for studies in which this framework is implemented, tested, and arguably adjusted for improvement, lies open. Time can then tell whether the approach proposed in this dissertation itself is sustainable.

A second potentially worthwhile avenue for future research relates to the timeframe over which sustainable employability is considered. That is, the studies in this dissertation are limited to only two measurement occasions that are spaced two years apart. As noted in Chapter 5 and 6, this low number of measurement occasions does not allow for the detection of potential curvilinear patterns in sustainable employability or its constituents over time. As such patterns most likely do exist and may provide relevant insights into how sustainable employability develops and can be improved, future studies could look into this (cf. Champoux, 1992; Duncan & Duncan, 2004). Additionally, it is most worthwhile to investigate the development in sustainable employability throughout individuals' entire working lives. That is, the ideal design for studies on sustainable employability includes a large sample with several measurement occasions throughout the working life, so that potential early exposure effects or common developmental patterns could be identified (Laberge & Ledoux, 2011). Such research would be very costly, but has the potential to offer a complete understanding of sustainable employability and its antecedents. Finally, more insights in the precise time course of cause and effect are necessary (Frese & Zapf, 1988). That is, it remains unclear what – besides the entire lifespan – constitutes an appropriate timeframe to study the effects of employment characteristics on sustainable employability and its separate indicators. As such, future studies should look into the ideal timeframe necessary for establishing the effects of specific employment characteristics on sustainable employability.

Third, it might be beneficial if future studies further develop the measurement of sustainable employability. That is, in line with one of the considerations on internal validity, further development of an ideal measure for sustainable employability is highly desirable. One of the challenges with measuring sustainable employability is that, appreciating its formative and integrative approach to functioning at work and in the labor market, it requires an integrative multi-indicator approach. Consequently, measures for sustainable employability tend to be impractically long (as also noted during studies on sustainable employability conducted besides this dissertation) and complex. As such, it may be beneficial if future studies develop a short but comprehensive measure for sustainable employability (Galesic & Bosnjak, 2009). Another challenge pertains to the inclination to rely on self-report measures. As it is known that self-report measures may be biased in several ways (Donaldson & Grant-Vallone; Spector, 1994), future research could look into capturing aspects of sustainable employability with multi-source data (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For example, to capture the job performance aspect of sustainable employability, data from supervisors or clients could be combined with self-assessed performance. Third, recognizing that sustainable employability should *formatively* capture an individual's ability to function at work and in the labor market, future research should be oriented keeping its measurement updated (cf. Heerkens, de Brouwer, Engels, van der Gulden, & Kant, 2017; Iezzoni & Greenberg, 2003). It is quite possible that alternative or even more comprehensive ways of capturing this ability or aspects thereof are developed in the future. As such, it is instrumental if future studies sustain a high-quality sustainable employability measure. Finally, the measures to capture sustainable employability as used in this dissertation are partly only suitable for people who are employed. For a complete understanding of sustainable employability, however, it is necessary to also consider sustainable employability among unemployed individuals. As such, future studies should explore ways in which the sustainable employability of unemployed individuals can be adequately measured.

Fourth, future studies on sustainable employability could benefit from a clear focus on specific groups of people. That is, the studies in this dissertation have used a general approach towards sustainable employability of healthcare workers to get a first grasp on what it is and how it can be measured and predicted. Arguably, this might not fully do justice to the potentially relevant heterogeneity of occupations within a specific sector (in this case healthcare). For a more in-depth understanding of sustainable employability, it may be beneficial to consider it in specific occupational

groups (e.g. medical specialists (Fleuren, Willems, van Hoof, Quanjel, & Westra, 2017)). Importantly, future research should also extend to unemployed individuals and approach this group as heterogeneous as well. That is, to truly maximize labor participation, unemployed individuals should be facilitated to participate as well (Devins & Hogarth, 2005). However, as this group is diverse due to the variety of potential causes of non-participation, it is instrumental to consider how sustainable employability of specific subgroups can be facilitated (Caliendo & Künn, 2011; Wanberg & Marchese, 1994). For example, a lot could be gained by actively striving for the inclusion of people with a mental disability in work (cf. Borghouts-van de Pas & Freese, 2017; van Ruitenbeek, Zijlstra, & Hulsheger, 2018).

Another avenue for future research could be to study the mechanisms through which and the conditions under which specific employment characteristics affect sustainable employability. As indicated by multitude of arrows in the conceptual model (Chapter 3), employment characteristics may affect each other and thereby affect sustainable employability (mechanisms) and effects of one employment characteristic on sustainable employability might be moderated by others (conditions). Studies on the mechanisms through which sustainable employability is affected by a specific employment characteristic would help in understanding why relationships exist. However, such studies would require at least three measurement occasions to justify any inferences of causality. Studies on conditions under which employment characteristic particularly affect sustainable employability might reveal important buffers or magnifiers of effects and deepen the understanding of for whom or under what conditions a characteristic is beneficial or harmful. Such studies require a theoretical basis on the interrelationships among employment characteristics for adequate positioning in the conceptual model.

Finally, future studies should look into viable interventions aimed at promoting sustainable employability. This dissertation has identified several relevant predictors of healthcare employees' sustainable employability, but it remains to be investigated how these can be used to design an effective intervention. Importantly, an effective intervention should target changes in the work and work-context (rather than simply individual characteristics), as these have been identified as relevant predictors of sustainable employability. Additionally, although some interventions for sustainable employability already exist (e.g., Koolhaas, 2014; Noben, Nijhuis, de Rijk, & Evers, 2012), these interventions have not yet been evaluated within the conceptual framework as proposed in this dissertation. As such, it may be

interesting to consider whether these existing interventions are effective in terms of ameliorating the development of sustainable employability over time. Importantly, it is likely challenging to establish causal effects of these interventions, considering the need for- and complexity of achieving adequate field experiments (e.g., Fleuren, de Grip, Kant, & Zijlstra, 2018). Moreover, based on the considerations in the previous paragraph, there is arguably a need for interventions targeting sustainable employability for specific (occupational) groups. Here it is essential to recognize, however, that the precise approach of an appropriate intervention is probably group-, context-, and need dependent (Bartholomew-Eldredge et al., 2016). As such, adequate interventions on sustainable employability should best be co-designed with organizations and/or individuals involved (van der Aa & van Berkel, 2014; Zijlstra, van Ruitenbeek, Mulders, & van Lierop, 2017). Finally, recognizing that employees are sometimes reluctant to utilize opportunities provided in interventions (e.g., Fleuren et al., 2018), it may be particularly interesting to investigate the decision process underlying the utilization of sustainable employability oriented interventions (cf. Rutten, 2018).

Conclusion

This dissertation provides several important steps in the conceptualization, measurement, and prediction of sustainable employability. With this dissertation, researchers now have a comprehensive way to investigate sustainable employability that clearly addresses its longitudinal component, distinguishes outcomes and antecedents, and recognizes the responsibility of both the organization and the individual. Moreover, sustainable employability's nature as a social construct and its implications for measurement are now explicitly recognized as well. Additionally, sustainable employability research can move on from a restricted focus on age and to a focus on changeable predictors. And finally, healthcare organizations now have some directions for targeting work and work-contextual characteristics in order to promote sustainable employability. Importantly, these steps are only the first of a larger research agenda aiming to gain a full understanding of sustainable employability and facilitating sustainable employment for everyone. There is much work to be done.

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Summary



Considering the central role of employment in people's lives and the necessity of maximizing participation in employment, sustainable employability is an essential topic for research. Particularly in countries that face population aging, an increasing retirement age, and where the nature of work becomes more complex, sustainable employability is an important topic on the agendas of the government, organizations, and individual employees or employment seeking individuals as well. Although sustainable employability is essential and generally recognized as such, the concept has yet to be defined adequately and comprehensively. The lack of a comprehensive definition currently complicates the measurement of sustainable employability and, consequently, researching and improving sustainable employability as well. As is argued in the present dissertation, an important reason for the lack of an adequate conceptualization may be due to the inherently longitudinal (i.e., 'sustainable' implies a long term) and integrative (i.e., 'employability' is a multicomponent concept) nature of the concept. As such, the main goal of this dissertation is to conceptualize sustainable employability in such a way that it enables the measurement and prediction of the construct, so that guidelines for interventions can be identified. To do so, it is essential to adequately determine the role of time in the concept and to recognize the contextual dependence of sustainable employability. As is described in the following paragraphs of this summary, these aspects are addressed by i) critically evaluating the currently leading definition of sustainable employability; ii) building on this critical evaluation and existing literature on sustainable employability to develop a novel conceptual framework in which sustainable employability is positioned as an integrative and time dependent construct; iii) identifying the appropriate measurement model of sustainable employability as formative and validating it as such; iv) examining the role of age and time effects on the construct of sustainable employability; and v) identifying intersectoral differences in and healthcare specific predictors of the development in sustainable employability.

In **Chapter 2** the currently leading definition of sustainable employability as formulated by van der Klink et al. (2016) is critically evaluated. Although this definition has several strengths, it also features some important points for improvement. Chapter 2 argues that this existing definition rightly positions sustainable employability as i) a multidimensional concept; ii) a shared responsibility of employers and employees; iii) a concept that requires a longitudinal approach. Points for improvement as discussed in Chapter 2 are that i) it remains unclear which aspects in an employment situation (including the employee) are part (rather than predictor or outcome) of sustainable employability; ii) sustainable

employability is wrongly positioned as consisting of aspects of the work context and the employee, while the unit that is employable can only be the employee; iii) it assumes that achieving value at work automatically leads to (or can even equated to) sustainable employability; iv) sustainable employability within the definition does not generalize to unemployed individuals; and v) the longitudinal aspect of sustainable employability is not clearly specified concretely. These aspects as discussed in Chapter 2 provide several directions to achieve a more comprehensive and clear definition of sustainable employability.

Chapter 3 builds on the aforementioned directions and other existing literature on sustainable employability to achieve a comprehensive conceptual framework. First, the general meaning of the elements ‘sustainable’ and ‘employability’ are considered to achieve a rough general working definition of sustainable employability as the ability of an individual to function at work and in the labor market not being affected negatively by the employment of that individual over time. This working definition already matches most of the requirements as formulated in Chapter 2. Subsequently, an interdisciplinary perspective on functioning at work and in the labor market is used to achieve a set of nine complementary indicators of an individual’s ‘employability’ (i.e., perceived health status, need for recovery, fatigue, work ability, job satisfaction, motivation to work, job performance, perceived employability, and the match between the required competences and the competences an individual has). This employability construct should then be captured repeatedly over a longer period of time, so that the ‘sustainability’ (i.e., positive growth or stability over time) in the development of employability can be captured and predicted. Finally, the framework suggests that aspects of the employment situation that have a positive effect on- or safeguard the stability in employability over time can be considered conditions of sustainable employment of an individual in work. Hereby, the resulting conceptual framework provides clear guidelines for research on sustainable employability.

Chapter 4 examines whether the proposed definition of sustainable employability can be validly translated into a measure combining the nine complementary indicators (i.e., perceived health status, need for recovery, fatigue, work ability, job satisfaction, motivation to work, job performance, perceived employability, and the match between the required competences and the competences an individual has). To this end, Chapter 4 empathically considers the distinction between reflective and formative measurement models, as it is essential in determining the validity of complex construct such as sustainable employability. Using an adapted checklist to

identify the appropriate measurement model for a construct, the chapter concludes that sustainable employability should have a formative measurement model. Considering the extensive implications of this conclusion regarding the conceptual understanding of sustainable employability (i.e., sustainable employability should be treated as a social construct rather than an existing latent variable) as well as its validation (i.e., factor analysis is no longer an appropriate tool for validation), several structural equation models (SEM) are used to explore the construct and concurrent validity of sustainable employability. For this purpose, self-report data from the 2,544 working participants of the Maastricht Cohort Study (MCS) regarding the several indicators of sustainable employability are used. Based on the models estimated, the proposed approach to sustainable employability seems valid in terms of construct and concurrent validity. Hereby, Chapter 4 does not only create an important basis for measuring sustainable employability, but also offers a relatively accessible approach to handling the distinction between formative and reflective constructs.

In **Chapter 5** the aforementioned validated approach to sustainable employability is used to examine the extent to which age and time effects are relevant to sustainable employability. Insights into age and time effects are of crucial importance in the context of sustainable employability, because it is often assumed that the sustainable employability of particularly older employees is at risk. Additionally, it would make little sense to develop sustainable employability interventions if all change in the construct over time is due to aging. Importantly, as age effects can be confounded by time effects, it is essential to distinguish both effects by modelling them simultaneously. Therefore, Chapter 5 estimates ten (i.e., one for the total sustainable employability construct and one for each of its nine indicators) multilevel regression models featuring age and time as predictors of sustainable employability (or its separate indicators), based on self-report data from 2,672 employees participating in two waves of the MCS. The estimated models show that only perceived health status and perceived general employability modestly but significantly decline with age. Additionally, time effects are found on fatigue, job performance, and the match between the competences that are required at work and the competences employees have themselves. Finally, the analyses also reveal that most variance in the nine separate indicators and the total sustainable employability construct exists between (61.43%-84.96%) rather than within people (15.04%-38.57%). These findings suggest that age is only modestly relevant to the sustainable employability of working individuals and that SE can be meaningfully conceptualized as a time

dependent construct. These conclusions provide grounds to reduce the focus on age both in sustainable employability research and –policies and to move on to approaches that focus on needs of individuals (rather than stereotypical needs of age groups) when facilitating sustainable employability.

Chapter 6 investigates the extent to which intersectoral differences are relevant to sustainable employability as well as which aspects of employment are relevant predictors of sustainable employability in healthcare specifically. This approach is necessary as sustainable employability of healthcare employees in particular seems to be at risk. By first considering the extent to which there are in fact intersectoral differences in the development of sustainable employability over time, this assumption is tested. Subsequently, the broad exploration of the potential effects of various employment characteristics may provide healthcare organizations with directions to facilitate the sustainable employability of their employees. Again, self-report data regarding the sustainable employability and employment aspects of employed participants of the MCS are used. Regarding the intersectoral differences ten separate SEMs are estimated (i.e. one for each of the nine indicators and the one for the total sustainable employability construct) featuring (the) sustainable employability (indicator) in 2012 and sector as predictors of (the) sustainable employability (indicator) in 2014, based on data from 2,346 participants employed in five different sectors (i.e., healthcare, industry, finance, public administration, and transportation). Concerning the healthcare specific analyses, data from 455 participants employed in healthcare are used to estimate ten separate similar SEMs, but now a series of employment characteristics (i.e., general job characteristics, psychosocial aspects of the work environment, the physical work environment, working time arrangements, work-private life balance, and HR practices) are included as predictors of SE in 2014 instead of the sector variables. Results from the first analyses suggest that the development of sustainable employability over time is more negative in the healthcare sector than in other sectors, particularly industry, and that this also differs for each of the nine sustainable employability indicators. Additionally, several predictors of the sustainable employability of healthcare employees are identified, particularly in the psychosocial domain, HR practices, and working time arrangements. Based on the intersectoral differences found in Chapter 6, it can be concluded that it is instrumental to consider sectors in sustainable employability research, particularly because of the differences in the development of the different sustainable employability indicators. Additionally, the healthcare specific predictors of sustainable employability suggest that

healthcare organizations should mainly help their employees to handle the negative interpersonal interactions at work, offer employees varied work, and to take into account potential side effects when implementing HR practices.

Chapter 7 offers an overarching contemplation of the entire dissertation. To this end, it first provides a summary of the main conclusions of each chapter. Second, the internal and external validity of the chapters together are evaluated. Regarding the internal validity it is observed that the chapters paint a coherent picture in the sense that no conflicting findings exist within the dissertation. Moreover, it seems that the internal validity is also not threatened in terms the possibility of making causal inferences based on the studies in the dissertation. That is, where correlation and temporal precedence are an issue, both of these conditions are met. There are also no obvious viable alternative explanations for the findings in this dissertation that are considered substantial threats to the internal validity of the dissertation. With regard to the external validity there do not seem to be any substantial threats in this dissertation either. That is, by using high quality and representative data it seems reasonable to assume that the findings of this dissertation can be generalized to other employed individuals in similar context. However, the importance of context should be emphasized profoundly as the conclusions are time, social security system, and conjuncture specific. Additionally it seems important as always to emphasize the importance of replication. Thirdly, Chapter 7 discusses the implications of the dissertation as a whole. The implications particularly pertain to the possibilities this dissertation may offer in terms of structuring and clarifying the debate regarding sustainable employability and related topics (e.g., extended working lives and arduous occupations). Additionally, this dissertation offers clear directions to guide research on sustainable employability that center on the need to distinguish between predictors and indicators of sustainable employability specifically, the importance of time and an integral approach to functioning, recognizing sustainable employability as a social construct, the limited relevance of age, and the importance of intersectoral differences and sector specific analyses. Finally, Chapter 7 discusses several directions for future research. Specifically, the chapter emphasizes the importance of replication, extending and establishing an adequate timeframe for sustainable employability research, continuing the development of a measurement instrument for sustainable employability, research in specific groups of people (e.g., occupation specific research and research among unemployed or disabled individuals), indepth research on the mechanisms by- and the conditions under which certain employment characteristics affect sustainable employability, and the

development of interventions to improve sustainable employability. Based on the aforementioned considerations, implications, and suggestions for future research, it can be concluded that this dissertation may form an important step in research on sustainable employability.

Samenvatting



Gezien de centrale rol van werk in de levens van mensen en de noodzaak zoveel mogelijk mensen aan het werk te houden is duurzame inzetbaarheid een essentieel onderwerp. Voornamelijk in landen waar vergrijzing plaatsvindt, de pensioenleeftijd omhoog gaat, en waar werk complexer wordt, is duurzame inzetbaarheid een belangrijk thema op de agenda van de overheid, organisaties en individuele werkenden en werkzoekenden. Hoewel duurzame inzetbaarheid essentieel is en het belang ervan breed erkend wordt, is het concept nog niet compleet adequaat gedefinieerd. Het gebrek aan een complete adequate definitie bemoeilijkt het meten van duurzame inzetbaarheid, waardoor het onderzoeken en verbeteren van duurzame inzetbaarheid eveneens een lastige aangelegenheid wordt. Zoals wordt gesteld binnen het voorliggende proefschrift schuilt de reden voor het ontbreken van een adequate conceptualisering van duurzame inzetbaarheid voor een belangrijk deel in het noodzakelijk longitudinale (nl. ‘duurzaam’ suggereert een lange termijn) en integratieve (nl. ‘inzetbaarheid’ is een multifactorieel bepaald begrip) karakter van het concept. Het hoofddoel van dit proefschrift is dan ook om duurzame inzetbaarheid zodanig te definiëren dat het mogelijk wordt het concept te meten en te voorspellen, om inzicht te krijgen in mogelijke aangrijppingspunten voor interventies. Daarbij is het essentieel om de rol van tijd op een goede manier inzichtelijk te maken en aandacht te besteden aan de contextafhankelijkheid van duurzame inzetbaarheid. Zoals in de overige alinea’s van deze samenvatting wordt beschreven, gebeurt dit door i) de bestaande leidende definitie van duurzame inzetbaarheid kritisch te beschouwen; ii) vanuit de voorgenoemde kritische beschouwing en andere literatuur over duurzame inzetbaarheid een nieuw conceptueel raamwerk te construeren waarin duurzame inzetbaarheid integratief en tijdsafhankelijk wordt gepositioneerd; iii) het passende meetmodel van duurzame inzetbaarheid als formatief construct te identificeren en te valideren; iv) het onderzoeken van de rol van leeftijds- en tijdseffecten op het construct duurzame inzetbaarheid; en v) het identificeren van intersectorale verschillen in- en zorg specifieke voorspellers van de ontwikkeling van duurzame inzetbaarheid.

In **Hoofdstuk 2** wordt in gegaan op de leidende definitie van duurzame inzetbaarheid als geformuleerd door van der Klink et al. (2016). Hoewel deze definitie van duurzame inzetbaarheid enkele sterke punten heeft, zijn er ook een aantal belangrijke punten voor verbetering te identificeren. Hoofdstuk 2 identificeert als sterke punten dat de definitie duurzame inzetbaarheid terecht positioneert als i) een multidimensionaal concept; ii) een gedeelde verantwoordelijkheid van werkgever en werknemer; en iii) een concept dat een longitudinale aanpak vereist.

Verbeterpunten voor deze bestaande definitie van duurzame inzetbaarheid zijn echter dat i) het niet duidelijk is welke aspecten binnen een werksituatie (inclusief de werknemer) onderdeel (versus voorspeller of uitkomst) zijn van duurzame inzetbaarheid; ii) duurzame inzetbaarheid wordt gezien als een combinatie van aspecten van het werk en de werknemer, terwijl slechts de werknemer de eenheid is die in bepaalde mate inzetbaar is; iii) wordt aangenomen dat waarde realiseren in werk automatisch leidt tot (of gelijk gesteld kan worden aan) duurzame inzetbaarheid; iv) duurzame inzetbaarheid binnen de definitie niet toepasbaar is op mensen die niet werken; en v) het longitudinale karakter van duurzame inzetbaarheid niet concreet gespecificeerd wordt. Deze aspecten bieden aanknopingspunten om te komen tot een meer complete en duidelijker definitie van duurzame inzetbaarheid.

Hoofdstuk 3 bouwt voort op de aanknopingspunten als genoemd in de vorige alinea, maar ook op inzichten uit andere bestaande op het gebied van duurzame inzetbaarheid om te komen tot een compleet conceptueel raamwerk. Als eerste wordt gekeken naar de precieze globale betekenis van de elementen ‘duurzaam’ en ‘inzetbaarheid’ om te komen tot een ruwe werkdefinitie van duurzame inzetbaarheid als dat het vermogen om te functioneren in werk en op de arbeidsmarkt niet negatief mag worden beïnvloed door de inzet van de individu die het betreft over de tijd. Deze ruwe definitie voldoet aan de meeste eisen voor een adequate definitie als geformuleerd in Hoofdstuk 2. Vanuit een interdisciplinair perspectief op functioneren in werk worden bestaande benaderingen van duurzame inzetbaarheid gecombineerd tot een set van negen complementaire indicatoren die een indicatie kunnen geven van de inzetbaarheid van een individu (nl. ervaren gezondheid, herstelbehoefte, vermoeidheid, werkvermogen, arbeidstevredenheid, motivatie om te werken, arbeidsprestatie, algemene ervaren employability, en de match tussen gevraagde competenties en competenties die men zelf heeft). Dit inzetbaarheidsconstruct moet vervolgens over een langere tijd herhaaldelijk worden gemeten, zodat de duurzaamheid (nl. positieve groei of stabiliteit over de tijd) in de ontwikkeling in inzetbaarheid kan worden vastgesteld en worden voorspeld. Tot slot wordt binnen het raamwerk gesteld dat aspecten van de werksituatie die een positieve ontwikkeling in- of stabiliteit van inzetbaarheid over de tijd stimuleren in combinatie kunnen worden gezien als een duurzame inzet van een individu in werk. Het resulterende conceptuele raamwerk geeft daarmee duidelijke richtlijnen voor onderzoek op het gebied van duurzame inzetbaarheid.

Hoofdstuk 4 onderzoekt of de voorgestelde definitie van duurzame inzetbaarheid op een valide manier kan worden vertaald in een meting van het construct als een combinatie van de negen complementaire indicatoren (nl. ervaren gezondheid, herstelbehoefte, vermoeidheid, werkvermogen, arbeidstevredenheid, motivatie om te werken, arbeidsprestatie, algemene ervaren employability, en de match tussen gevraagde competenties en competenties die men zelf heeft). Hiertoe gaat Hoofdstuk 4 nadrukkelijk in op het onderscheid tussen reflectieve en formatieve meetmodellen, omdat dit onderscheid essentieel is bij het bepalen van de validiteit van complexe constructen als duurzame inzetbaarheid. Aan de hand van een aangepaste checklist voor het vaststellen van het passende meetmodel voor een construct, wordt geconcludeerd dat duurzame inzetbaarheid een formatief meetmodel moet hebben. Gezien de verregaande implicaties van deze conclusie met betrekking tot het begrip van het duurzame inzetbaarheidsconstruct (nl. duurzame inzetbaarheid moet worden gezien als een sociaal construct en niet als een bestaande latente variabele) en validatie (nl. factor analyse is niet langer een geschikt hulpmiddel), wordt aan de hand van verschillende structural equation modellen (SEM) de validiteit van het totaal construct en de concurrente validiteit verkend. Hiertoe wordt gebruik gemaakt van zelf gerapporteerde data afkomstig uit de Maastrichtse Cohort Studie (MCS) van 2,544 werkende deelnemers, over de verschillende indicatoren van duurzame inzetbaarheid. Op basis van de geschatte modellen lijkt de voorgestelde benadering om duurzame inzetbaarheid meetbaar te maken valide. Hiermee legt Hoofdstuk 4 niet alleen een mogelijk belangrijke basis voor het meten van duurzame inzetbaarheid, maar biedt het onderzoekers tevens een relatief toegankelijke benadering om het onderscheid tussen reflectieve en formatieve constructen te hanteren.

In **Hoofdstuk 5** wordt aan de hand van de in voorgaande voorgestelde en gevalideerde benadering van duurzame inzetbaarheid onderzocht in welke mate leeftijds- en tijdseffecten van belang zijn voor duurzame inzetbaarheid. Inzicht in leeftijds- en tijdseffecten is van cruciaal belang in het kader van duurzame inzetbaarheid, omdat vaak wordt aangenomen dat duurzame inzetbaarheid van met name oudere werknemers in het geding is. Daarnaast zou het, gezien de tijdsafhankelijke aard van duurzame inzetbaarheid, weinig zin hebben om duurzame inzetbaarheidsinterventies te ontwikkelen wanneer alle verandering in het construct over de tijd te maken heeft met veroudering. Aangezien leeftijdseffecten kunnen worden vertekend door tijdseffecten is het van belang deze gelijktijdig te modelleren en daarmee te ontwarren. Hoofdstuk 5 bekijkt daar toe op basis van data van 2,672

werkende deelnemers aan twee meetmoment van de MCS een tiental (nl. een voor elk van de negen duurzame inzetbaarheidsindicatoren apart en een voor het totale duurzame inzetbaarheidsconstruct) multilevel regressiemodellen met leeftijd en tijd als voorspellers. Uit deze modellen blijkt dat slechts de ervaren gezondheid en de ervaren algemene employability bescheiden afnemen met leeftijd. Daarnaast worden tijdseffecten gevonden op vermoeidheid, arbeidsprestatie en de match tussen de competenties die gevraagd worden op het werk en de competenties die medewerkers zelf hebben. Tot slot blijkt dat de meeste variantie in de indicatoren en het totale duurzame inzetbaarheidsconstruct tussen (61.43%-84.96%) en niet binnen personen (15.04%-38.57%) bestaat. Deze bevindingen suggereren dat leeftijd slechts een beperkte rol speelt bij de duurzame inzetbaarheid van werkenden en dat duurzame inzetbaarheid op een betekenisvolle manier als tijdsafhankelijk kan worden bekeken. Deze conclusies geven aanleiding om de focus op leeftijd binnen duurzame inzetbaarheidsonderzoek en -beleid wellicht wat af te zwakken en in plaats daarvan te kiezen voor benaderingen die rekening houden met de behoeftes van individuen (in plaats stereotype behoeften van leeftijdsgroepen) bij het faciliteren van duurzame inzetbaarheid.

Hoofdstuk 6 onderzoekt de mate waarin intersectorale verschillen een rol spelen bij duurzame inzetbaarheid en welke werkaspecten specifiek binnen de zorgsector belangrijke voorspellers van duurzame inzetbaarheid zijn. Deze benadering is belangrijk, omdat duurzame inzetbaarheid van met name medewerkers in de zorgsector onder druk lijkt te staan. Door eerst na te gaan of er intersectorale verschillen in de ontwikkeling in duurzame inzetbaarheid over de tijd bestaan wordt deze aannname getoetst. Vervolgens biedt de brede verkenning van de effecten van verschillende werkaspecten een aantal aanknopingspunten voor zorgorganisaties om de duurzame inzetbaarheid van hun medewerkers te faciliteren. Opnieuw is gebruik gemaakt van zelfgerapporteerde data over duurzame inzetbaarheid en werk onder werkende deelnemers van de MCS. Met betrekking tot de intersectorale verschillen in duurzame inzetbaarheid zijn op basis van data van 2,346 werkenden in vijf verschillende sectoren (nl. zorg, industrie, financiën, openbaar bestuur, en vervoer) tien afzonderlijke SEMs (nl. een voor elk van de negen indicatoren apart en een voor het totale duurzame inzetbaarheidsconstruct) geschat met sector en (de) duurzame inzetbaarheid(sindicator) in 2012 als voorspellers van (de) duurzame inzetbaarheid(sindicator) in 2014. Voor de zorg specifieke analyses zijn op basis van data van 455 werkenden in de zorg opnieuw tien afzonderlijke SEMs geschat, maar nu met in plaats van sector als voorspeller een reeks van werkaspecten

als voorspellers (nl. algemene werkkenmerken, psychosociale aspecten van werken, de fysieke werkomgeving, werktijdregelingen, de werk-privé balans, en HR praktijken). Uit de eerste analyses komt als eerste naar voren dat de ontwikkeling van duurzame inzetbaarheid over de tijd binnen de zorgsector negatiever is dan binnen de andere sectoren, met name de industrie, en dat dit verschilt voor de negen verschillende duurzame inzetbaarheidsindicatoren. Daarnaast worden in de tweede analyses verschillende voorspellers van duurzame inzetbaarheid binnen de zorg geïdentificeerd, met name binnen het psychosociale domein, HR praktijken, en werktijdregelingen. Op basis van de intersectorale verschillen in Hoofdstuk 6 kan worden geconcludeerd dat het instrumenteel is om rekening te houden met sectoren binnen onderzoek naar duurzame inzetbaarheid, vooral omdat het er verschillen zijn in de ontwikkeling van de verschillende duurzame inzetbaarheidsindicatoren. Daarnaast suggereren de zorg specifieke voorspellers van duurzame inzetbaarheid dat zorgorganisaties vooral hun werknemers moeten helpen om te gaan met de negatieve interpersoonlijke interacties op het werk, gevarieerd werk moeten bieden, en bij het implementeren van HR praktijken rekening moeten houden met mogelijke negatieve bijwerkingen.

Hoofdstuk 7 biedt een overkoepelende beschouwing van de het gehele proefschrift. Hier toe wordt allereerst een samenvatting van de belangrijkste conclusies van de verschillende hoofdstukken gegeven. Ten tweede worden de interne en externe validiteit van de dissertatie als geheel beschouwd. Met betrekking tot de interne validiteit kan worden opgemerkt dat de hoofdstukken een coherent geheel vormen, in die zin dat er geen tegenstrijdige bevindingen binnen het proefschrift worden gedaan. Tevens lijkt de interne validiteit in termen van de mogelijkheid tot causale inferentie op basis van de studies in het proefschrift niet in het geding. Daar waar correlatie en temporele precedentie vereisten zijn wordt hier ook aan voldaan. Daarnaast zijn er geen duidelijke alternatieve verklaringen voor de bevindingen binnen het proefschrift die de interne validiteit zouden kunnen bedreigen. Voor wat betreft de externe validiteit lijken er eveneens geen duidelijke redenen om aan te nemen dat deze bedreigd is. Door gebruik van kwalitatief goede en representatieve data kan in redelijkheid worden aangenomen dat de bevindingen zullen generaliseren naar werkenden in een vergelijkbare context. Het belang van context (nl. tijd en plaats) verdient weliswaar nadruk, omdat de bevindingen gedaan zijn binnen een bepaald tijdsbestek, een specifiek stelsel van sociale zekerheid, en binnen een bepaalde conjunctuur. Ook blijft het te allen tijde belangrijk het belang van replicatie te onderstrepen. Ten derde bespreekt Hoofdstuk 7 de implicaties

van het proefschrift als geheel. De implicaties liggen vooral in de mogelijkheid om het debat rondom duurzame inzetbaarheid en aanverwante onderwerpen (bv. langer doorwerken en zware beroepen) te verduidelijken. Daarnaast biedt het proefschrift duidelijke richtlijnen om onderzoek over duurzame inzetbaarheid vorm te geven, waarbij het onderscheid tussen voorspellers en indicatoren van duurzame inzetbaarheid, het tijdsaspect, een integrale benadering, het erkennen van duurzame inzetbaarheid als sociaal construct, de beperkte aanwezigheid van leeftijdseffecten, en het belang van intersectorale verschillen en sector specifieke analyses kernpunten zijn. Tot slot bespreekt Hoofdstuk 7 enkele suggesties voor toekomstig onderzoek. Hier worden met name het belang van replicatie, het uitbreiden en vaststellen van een adequaat tijdsbestek om duurzame inzetbaarheid te onderzoeken, het doorontwikkelen van een meetinstrument voor duurzame inzetbaarheid, onderzoek binnen specifieke groepen (bv. beroepsgroepen, mensen die niet werken, en mensen met arbeidsbeperkingen), diepte onderzoek naar mechanismen waardoor en condities waaronder bepaalde werkaspecten duurzame inzetbaarheid beïnvloeden, en het ontwikkelen van interventies voor duurzame inzetbaarheid voorgesteld. Concluderend kan worden gesteld dat met de genoemde overwegingen, implicaties en suggesties voor de toekomst dit proefschrift een belangrijke stap kan vormen in onderzoek naar duurzame inzetbaarheid.

Appendix A

Supplement to chapter 4

Introductory description of the supplement

The present writing concerns the supplement to the article entitled “Handling the reflective-formative measurement conundrum: A practical illustration based on sustainable employability” as published in Journal of Clinical Epidemiology and Chapter 4 of the present dissertation (Fleuren, van Amelsvoort, Zijlstra, de Grip, & Kant, 2018). This supplement provides additional information to readers of the aforementioned publication. Specifically, it provides information regarding (A) exclusion criteria of participants; (B) details regarding the self-report questionnaires used in the study; (C) factor analyses for each of the multiple-item questionnaires used; (D) rationale and results of the main MIMIC model as also reported in the aforementioned publication; (E) rationale and results of the MIMIC-models with each individual formative indicator of sustainable employability (SE) as formative indicator and the three perceived ability and willingness to work until the retirement age (PAWW) items as reflective indicators; (F) rationale and results of an overall model including all of the formative indicators of SE as predictors of the three PAWW items, without the latent factor SE included in the model; and (G) rationale and results of two simplified MIMIC models where not the PAWW items, but a single formative indicator was used as a reflective indicator of SE to achieve model identification. Finally, section (H) provides a short conclusion regarding the models discussed under topics (D) till (G).

A. Details about exclusion criteria

As described in the publication, all respondents that were not working at time of survey completion were excluded from the analyses. Table A.1 provides for each specific reason of exclusion the number of participants excluded. No other exclusion criteria were applied.

Table A.1. Details about exclusion criteria

| N excluded | Reason for exclusion |
|------------|--|
| 1313 | Respondents had indicated they were retired. |
| 283 | Respondents had indicated they were not currently employed. |
| 377 | Respondents had indicated they were currently employed but had not indicated that they were currently working. |
| 57 | Respondents had indicated they were absent from work. |
| 29 | Respondents had indicated they received sickness benefits. In the Netherlands, sickness benefits are provided by the government to people who cannot work due to sickness and who do not receive the regular sick leave payment from their employer. |
| 23 | Respondents had indicated they were unable to work because of a handicap. |
| 8 | Respondents had indicated they were on parental-, adoption-, or pregnancy leave. |
| 3 | Respondents had indicated they were on sabbatical leave. |
| 146 | Respondents had indicated they had more than one job. |

B. Details about questionnaires used

As mentioned in the publication, a set of self-report questionnaires was used to measure the constructs used in the analyses. Among the measured constructs the formative indicators of SE were: included subjective health, need for recovery, fatigue, work ability, skill gap, employability, performance, job satisfaction and motivation. In addition to these constructs PAWW was measured to serve as reflective indicators. For each of the multiple-item measures described below, tables describing the confirmatory factor analysis (CFA) results are provided in the next section (Table A.2-A.9). Table A.10 presents the fit-indices of all CFAs.

Subjective health was measured with one item from the MOS 36-item Short-Form Health Survey (SF-36) questionnaire, specifically the item “In general, would you say your health is: 1) excellent; 2) very good; 3) good; 4) fair; 5) poor” (Ware & Sherbourne, 1992). Previous research indicated that this single item is an excellent way of measuring subjective health, with great predictive validity in terms of mortality and healthcare utilization (DeSalvo, Fan, McDonell, & Fihn, 2005).

Need for recovery was assessed using the Need for Recovery Scale from the Dutch Questionnaire on the Experience and Evaluation of Work (VBBA) (van Veldhoven & Broersen, 2003; van Veldhoven & Meijman, 1994). The scale contained eleven dichotomous items, representing short-term effects of a working day. Examples of items are ‘By the end of the working day, I feel really worn out’ and ‘Generally, I need more than an hour before I feel completely recuperated after work’. In our sample, the scale had a high reliability ($\alpha = .89$, $n = 2462$). CFA results for this eleven-item scale are provided in Table A.2.

Fatigue was measured using the subjective experience of fatigue subscale from the Checklist Individual Strength (CIS). The CIS was originally developed for studies of chronic fatigue syndrome in hospital settings (Vercoulen et al., 1994). It was extensively tested in clinical setting (Vercoulen, Hommes, et al., 1996; Vercoulen, Swanink, et al., 1996) and validated in the working population as well (Beurskens et al., 2000). The CIS contains twenty items scored on 7-point Likert scales to which participants were instructed to respond by indicating how they felt during the last two weeks. These items were divided over four subscales measuring separate aspects of fatigue, namely concentration, motivation, physical activity, and subjective experience of fatigue. The subjective experience of fatigue subscale consisted of eight items (e.g. ‘I feel tired’) that showed high internal

consistency in our sample ($\alpha = .95$, $n = 2444$). CFA results for this eight-item are provided in Table A.3.

Workability was assessed using three items from the Work Ability Index (Ilmarinen, 2006, 2007). Specifically the first three items were used (i.e. ‘If you were to rate your work ability as a 10 out of 10 in the best period of your life, how would you rate your current work ability? (0 means you are completely unable to perform your job both physically and mentally, 10 means you are better able to work than ever before)’, ‘How would you rate your current work ability in relation to the physical demands of your job?’, and ‘How would you rate your current work ability in relation to the mental demands of your job?’). The first question was scored on an 11-point scale and the second and third questions on 5-point scales (ranging from 1 = very bad to 5 = very good). As previously demonstrated by El Fassi et al. (2013), work ability can be adequately assessed using only the first item. Nonetheless, we decided to include the second and the third item as well to be able to differentiate between physical and mental demands (Weigl, Müller, Hornung, Zacher, & Angerer, 2013). In our sample the three-item scale had a rather low reliability ($\alpha = .64$, $n = 2515$). CFA results for this three-item scale are provided in Table A.4.

Skill gap was measured using a ten item-pair scale adapted from the HBO-monitor (Hamburg & van der Velden, 2016). This scale consisted of several skills/competencies and asked participants per skill to rate the level of skill required for their job and their own level of skill. Both aspects were rated on 5-point scales ranging from 1 = ‘very low’ to 5 = ‘very high’. To calculate the gap per skill, the score on a respondent’s own level of skill was subtracted from the score on the skill level required (e.g. if a participant’s job had very high skill requirement (5) and the participant had a very low level of skill (1) then the gap was $5 - 1 = 4$ for that skill). It was possible that this resulted in a ‘negative gap’ or a ‘skill surplus’, but as the meaning of this surplus was hard to interpret, we recoded skill surplus to a gap of 0 for all ten of the item-pairs. Examples of skills included in the scale are ‘Knowledge of your own professional area’ and ‘Ability to use communicative skills’. It was later decided that one of the items (i.e. ‘capacity to perform physically demanding work’) as it was not really a skill and this aspect was also covered by the items from the WAI. The result was a nine item-pair scale with an acceptable reliability ($\alpha = .73$, $n = 2032$). CFA results for this nine-item scale are provided in Table A.5.

Performance was measured with an adapted version of the core task performance scale that was originally developed by Williams and Anderson (1991). The original scale consisted of seven items, but was later reduced to four by Dyne and LePine (1998) who removed all the negatively formulated items. This four item scale was designed for managers to rate the performance of their employees. For the purpose of this study this four item scale was transformed into a self-report scale instead. Examples of items are ‘I meet the performance standards of my job’ and ‘I accomplish the tasks appointed to me to a satisfactory standard’. All items were scored on 5-point Likert scales, ranging from 1 = ‘completely disagree’ to 5 = ‘completely agree’. The reliability of the scale was high ($\alpha = .93$, $n = 2513$). CFA results for this four-item scale are provided in Table A.6.

Employability was measured using single three items. The first of these items was self-constructed and measured job-internal employability; ‘I am convinced that I could keep my current job until retirement, if I wanted to.’ The other two items were adapted from a self-report employability questionnaire by de Cuyper and De Witte (2011). Some minor changes were made so that these items would fit the context of our survey. Specifically the item ‘I could easily change jobs within my current organization, if I wanted to’ was used to measure firm-internal employability, and the item ‘I could easily get a job within another organization, if I wanted to’ was used to measure external employability. All items were scored on 5-point Likert scales, ranging from 1 = ‘completely disagree’ to 5 = ‘completely agree’. Cronbach’s alpha of this composite scale was low ($\alpha = .33$, $n = 2506$). This was not surprising considering the different types of employability measured by these items.

Motivation was measured using the motivation subscale from the CIS (Vercoulen et al., 1994). This subscale consisted of four items (e.g. ‘I feel no desire to do anything’). Although this subscale may not be the most appropriate instrument to measure motivation, it was the best option within the available dataset. As it does measure a general motivation to be active, we consider it to be sufficiently appropriate for the purposes of the model. The scale itself functioned well with a Cronbach’s alpha of ($\alpha = .84$, $n = 2487$). CFA results for this four-item scale are given in Table A.7.

Job satisfaction was measured using three items from a shortened 12-item version of the Utrecht Work Engagement Scale (UWES) (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002). Specifically the items ‘I am enthusiastic about my job’, ‘when I get up in the morning I feel like going to work’, and ‘I am proud of the work

I do' were used. Items were scored on 7-point scales ranging from 0 = 'never' to 6 = 'daily'. This three-item scale had a good reliability ($\alpha = .84$, $n = 2503$). CFA results for this three-item scale are provided in Table A.8.

Perceived ability and willingness to work until the official retirement age (PAWW) were measured by three items. Each of the items covered a different aspect so that item 1 'I believe to be mentally able to continue working in my current job until the retirement age that currently applies to me' measured mental ability, item 2 'I believe to be physically able to continue working in my current job until the retirement age that currently applies to me' measured physical ability, and item 3 'It is my intention to remain working until the retirement age that currently applies to me' measured willingness. Items were scored on a 5-point Likert scale, ranging from 1 = 'completely disagree' and 5 'completely agree'. These three items were adapted versions of items from van Dam, van der Vorst, and van der Heijden (2009). CFA results for this three-item construct are provided in Table A.9.

Interpretation of results

As can be seen from the tables below as well as the Cronbach's alphas reported above, the scales generally function as intended.

C. Tables with CFA results for each of the multiple-item questionnaires

As mentioned above this section of the supplement features the tables for CFAs on all multiple-item questionnaires. Figure A.1 depicts the type of model (reflective) that was used to conduct all CFAs as an example. In this example the performance scale is subject to the CFA.

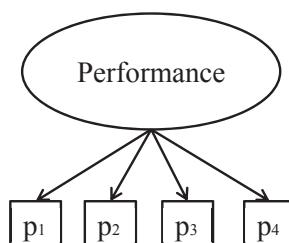


Figure A.1. Example of a confirmatory factor analysis model (CFA) for performance. The model depicts performance as latent variable as estimated from the four performance items. Square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated from the items.

Table A.2. Item-factor loadings for the Need for Recovery scale

| Item | Loading | Standard Error | Est./S.E. | P-value |
|---|---------|----------------|-----------|---------|
| 1. I find it difficult to relax at the end of a working day | .665 | .012 | 53.70 | .001 |
| 2. By the end of the working day, I feel really worn out | .774 | .010 | 81.30 | .001 |
| 3. Because of my job, at the end of the working day I feel rather exhausted | .753 | .010 | 74.56 | .001 |
| 4. After the evening meal, I generally feel in good shape | .661 | .012 | 52.89 | .001 |
| 5. In general, I only start to feel relaxed on the second non-working day | .647 | .013 | 50.37 | .001 |
| 6. I find it difficult to concentrate in my free time after work | .623 | .013 | 46.24 | .001 |
| 7. I cannot really show any interest in other people when I have just come home myself | .516 | .016 | 32.42 | .001 |
| 8. Generally, I need more than an hour before I feel completely recuperated after work | .730 | .011 | 68.53 | .001 |
| 9. When I get home from work, I need to be left in peace for a while | .509 | .016 | 31.73 | .001 |
| 10. Often, after a day's work I feel so tired that I cannot get involved in other activities | .720 | .011 | 65.95 | .001 |
| 11. A feeling of tiredness prevents me from doing my work as well as I normally would during the last part of the working day | .403 | .018 | 22.60 | .001 |

Note. Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.3. Item-factor loadings for the subjective experience of fatigue subscale of the Checklist Individual Strength

| Item | Loading | Standard Error | Est./S.E. | P-value |
|--|----------------|-----------------------|------------------|----------------|
| 1. I feel fit | .860 | .007 | 115.96 | .001 |
| 4. Physically I feel exhausted | .724 | .018 | 40.89 | .001 |
| 6. I feel tired | .836 | .010 | 80.03 | .001 |
| 9. I feel powerless | .770 | .013 | 60.63 | .001 |
| 12. I am rested | .811 | .011 | 74.70 | .001 |
| 14. Physically I feel I am in bad form | .748 | .014 | 52.60 | .001 |
| 16. I tire easily | .850 | .009 | 99.56 | .001 |
| 20. Physically I feel I am in an excellent condition | .817 | .010 | 80.50 | .001 |

Note. Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.4. Item-factor loadings for the three-item shortened version of the Work Ability Index

| Item | Loading | Standard Error | Est./S.E. | P-value |
|---|---------|----------------|-----------|---------|
| 1. If you were to rate your work ability as a 10 out of 10 in the best period of your life, how would you rate your current work ability? ('0' means you are completely unable to perform your job both physically and mentally, '10' means you are better able to work than ever before) | .752 | .013 | 56.57 | .001 |
| 2. How do you rate your current work ability in relation to the physical demands of your job? (5-point scale ranging from very bad to very good) | .776 | .022 | 36.08 | .001 |
| 3. How do you rate your current work ability in relation to the mental demands of your job? (5-point scale ranging from very bad to very good) | .675 | .025 | 27.23 | .001 |

Notes. Factor variance was fixed to 1 to circumvent model saturation; Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.5. Item-factor loadings of the self-constructed skill gap scale

| Item | Loading | Standard Error | Est./S.E. | P-value |
|---|----------------|-----------------------|------------------|----------------|
| 1. Knowledge of your own professional area (e.g. knowledge of specific products, services, machines, processes you encounter) | .478 | .036 | 13.22 | .001 |
| 2. Ability to use information- and communications technology (ICT) for general administrative and/or communicative purposes (e.g. word processing, e-mail, internet) | .389 | .035 | 11.09 | .001 |
| 3. Ability to use ICT for specific work related purposes (e.g. designing software, planning software and/or software for operating machinery) | .481 | .036 | 13.20 | .001 |
| 4. Ability to use communicative skills (e.g. dealing with people, working in a team, listening to co-workers) | .480 | .040 | 11.94 | .001 |
| 5. Ability to plan and coordinate own work with work of others | .420 | .036 | 11.61 | .001 |
| 6. Ability to notice problems, analyze them and propose solutions | .522 | .033 | 15.96 | .001 |
| 7. Ability to deal with changes in work | .585 | .033 | 17.86 | .001 |
| 8. Ability to keep up with new knowledge and developments | .665 | .029 | 23.28 | .001 |
| 9. Ability to communicate in English | .342 | .037 | 9.19 | .001 |

Note. Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.6. Item-factor loadings for the Core Performance Scale

| Item | Loading | Standard Error | Est./S.E. | P-value |
|--|----------------|-----------------------|------------------|----------------|
| 1. I fulfill the responsibilities that are described in my job description | .781 | .021 | 36.35 | .001 |
| 2. I complete the tasks that are expected of me | .912 | .013 | 71.39 | .001 |
| 3. I meet the performance standards of my job | .930 | .008 | 120.89 | .001 |
| 4. I accomplish the tasks appointed to me to a satisfactory standard | .924 | .011 | 82.83 | .001 |

Note. Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.7. Item-factor loadings for the motivation subscale of the Checklist Individual Strength

| Item | Loading | Standard Error | Est./S.E. | P-value |
|--|----------------|-----------------------|------------------|----------------|
| 2. I feel very active | .768 | .015 | 51.40 | .001 |
| 5. I feel like doing lots of nice things | .764 | .016 | 47.01 | .001 |
| 15. I have a lot of plans | .728 | .016 | 44.68 | .001 |
| 18. I don't feel like doing anything | .790 | .014 | 56.85 | .001 |

Note. Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.8. Item-factor loadings for the three-item job satisfaction scale adapted from the Utrecht Work Engagement Scale

| Item | Loading | Standard Error | Est./S.E. | P-value |
|---|----------------|-----------------------|------------------|----------------|
| 1. I am enthusiastic about my job | .828 | .012 | 70.86 | .001 |
| 2. When I get up in the morning I feel like going to work | .688 | .021 | 33.05 | .001 |
| 3. I am proud of the work I do | .798 | .019 | 41.69 | .001 |

Notes. Factor variance was fixed to 1 to circumvent model saturation; Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.9. Item-factor loadings for the perceived ability and willingness to work construct

| Item | Loading | Standard Error | Est./S.E. | P-value |
|--|----------------|-----------------------|------------------|----------------|
| 1. I fulfill the responsibilities that are described in my job description | .829 | .009 | 92.42 | .001 |
| 2. I complete the tasks that are expected of me | .723 | .020 | 36.49 | .001 |
| 3. I meet the performance standards of my job | .413 | .022 | 19.04 | .001 |

Notes. Factor variance was fixed to 1 to circumvent model saturation; Reported factor loadings are standardized, transcribed from the Mplus 7 STDYX output

Table A.10. Fit indices for each of the multiple-item questionnaires

| First-order factor | χ^2 | df | CFI | TLI | RMSEA | RMSEA 90% C.I. |
|--|----------------------------|-----------|------------|------------|--------------|-----------------------|
| 1. Need for recovery | 1260.37* | 44 | .890 | .863 | .105 | .100 - .110 |
| 2. Fatigue | 546.67* | 20 | .930 | .901 | .102 | .095 - .109 |
| 3. Work ability** | 51.10* | 1 | .926 | .779 | .141 | .109 - .175 |
| 4. Skill gap | 303.04* | 27 | .824 | .765 | .064 | .058 - .071 |
| 5. Performance | 40.26* | 2 | .974 | .921 | .087 | .065 - .111 |
| 6. Motivation | 20.20* | 2 | .991 | .972 | .060 | .038 - .085 |
| 7. Job satisfaction** | 27.33* | 1 | .973 | .918 | .102 | .071 - .137 |
| 8. Perceived ability and willingness to work** | 4.69* | 1 | .996 | .989 | .038 | .010 - .076 |

Notes. No modification indices to specify additional paths were used in the estimation process; * = significant at $p < .05$; ** = factor variance was fixed to 1 to circumvent model saturation.

D. Results of a MIMIC-model with all formative indicators of SE and PAWW items as reflective indicators

For completeness we report the multiple indicator multiple cause (MIMIC) model as used in our paper to assess the validity of the formative indicators together as a set here as well (Figure A.2). This MIMIC model was estimated because a standalone formative measurement model would not be identified using structural equation modeling (SEM) software (Bollen & Bauldry, 2011). That is, the formative construct would have lacked a scaling variable if it did not include a reflective indicator. We solved this issue by adding reflective indicators to the formative factor to provide scaling. Such indicators should either capture the full formative construct or be variables that should theoretically be outcomes of the construct. As such we used three items capturing perceived ability and willingness to work (PAWW) until the age eligible for retirement. These items were adapted from a previous study where they were used to operationalized SE (Oude Hengel, Blatter, Geuskens, Koppes, & Bongers, 2012). Although we considered PAWW too narrow to capture SE itself, we considered it a sufficiently broad theoretical outcome of SE (e.g. because reality precedes perception) lending itself as reflective indicator in the MIMIC model. As depicted on page 18, in the resulting model the formative factor as scaled by the PAWW items was regressed on the formative indicators (i.e. subjective health, need for recovery, fatigue, work ability, skill gap, employability, performance, job satisfaction, and motivation) to obtain weights for each of the formative indicators. Indices of model fit (Diamantopoulos, Riefler, & Roth, 2008; Diamantopoulos & Winklhofer, 2001) as interpreted using conventional criteria (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996) and the variance of the error term of the construct (Diamantopoulos et al., 2008; Diamantopoulos & Siguaw, 2006; Williams, Edwards, & Vandenberg, 2003) were used to approximate validity.

Indices of model fit indicated that the MIMIC-model fitted the data well ($\chi^2 = 3670.051$, $df = 1073$, $p > .01$, $CFI = .937$, $TLI = .930$, $RMSEA = .031$ (90% C.I. = .030 - .032)). Moreover, as shown in Table A.11, six out of eleven path coefficients between the SE's formative indicators and the second-order factor SE were significant. Additionally, the R-square of the second-order factor SE was .30 ($p < .001$), indicating the amount of variance in SE as explained by its formative indicators. These findings suggested that a formative measurement model for SE fitted the data well and that the formative indicators functioned well together as a set.

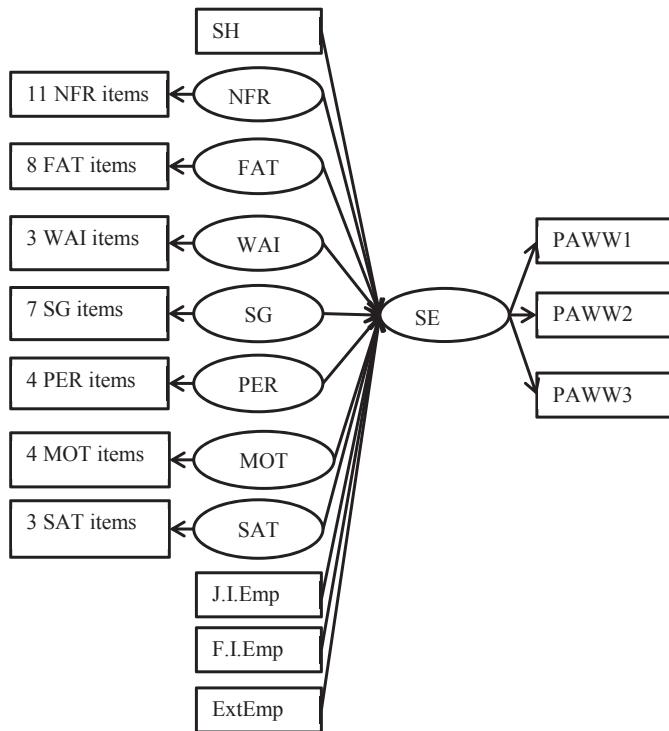


Figure A.2. Schematic depiction of the MIMIC model including all of the formative indicators of SE as and the three PAWW items as reflective indicators. The model depicts all formative indicators of SE as well as the three reflective PAWW items. Square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated from the items. All variables in the middle column are the formative indicators of SE. All variables in the right column are PAWW items. All variables in the left column are items corresponding to the latent formative indicators of SE. Abbreviations are intended as follows: 1) SH = subjective health; NFR = need for recovery; FAT = fatigue; WAI = work ability; SG = Skill gap; PER = performance; MOT = motivation; SAT = job satisfaction; J.I.Emp = job internal employability; F.I.Emp = firm internal employability; ExtEmp = external employability; PAWW = perceived ability and willingness to work until the official retirement age.

Table A.11. Path coefficients for the effects of first-order factors on the second-order factor employability consisting of three reflective indicator items in a full MIMIC-model

| First-order factor | Path coefficient | Standard Error | Est./S.E. | P-value |
|-------------------------------------|-------------------------|-----------------------|------------------|----------------|
| 1. Subjective health (1 item) | .028 | .025 | 1.103 | .270 |
| 2. Need for recovery | .211* | .035 | 5.975 | .001 |
| 3. Fatigue | .053 | .045 | 1.178 | .239 |
| 4. Work ability | .343* | .040 | 8.500 | .001 |
| 5. Skill gap | .031 | .024 | 1.290 | .197 |
| 6. Performance | -.029 | .023 | -1.257 | .209 |
| 7. Employability (3 separate items) | | | | |
| 1) Job internal employability | .141* | .019 | 7.626 | .001 |
| 2) Firm internal employability | .024 | .020 | 1.236 | .216 |
| 3) External employability | -.060* | .020 | -2.965 | .003 |
| 8. Motivation | -.123* | .042 | -2.929 | .003 |
| 9. Job satisfaction | .058* | .026 | 2.255 | .024 |

Note. Reported path coefficients are standardized, transcribed from the Mplus 7 STDYX output;
 * = significant at p <.05

E. Results of MIMIC-models with individual formative indicators of SE and PAWW

To complement the overall MIMIC model, correlations between each of the formative indicators of SE (i.e. its nine dimensions) and the three PAWW items were estimated separately to establish criterion validity of each of the nine formative indicators (Figure A.3 provides an example). This was done for each of the formative indicators (i.e. subjective health, need for recovery, fatigue, work ability, skill gap, employability, performance, job satisfaction, and motivation). In these each of these MIMIC-models one of the formative indicators served as a ‘predictor’ (i.e. formative indicator of the simplified SE construct) and the three PAWW items as ‘outcomes’ (i.e. reflective indicators of the simplified SE construct). This approach was necessary as a problem in the previously reported MIMIC model was that the estimated effect of each formative indicator on the construct was corrected for all of the others. As such, some indicator construct paths were insignificant which could suggest they are no meaningful additions to the SE construct. However, these formative indicators might still be theoretically relevant and empirically related to the criterion in absence of the other indicators. In the series of models presented in the present section, fit indices and path coefficient size and significance were used to evaluate criterion validity for each of the formative indicators.

Figure A.3 provides an example of one of such MIMIC-models, featuring performance as formative indicator. Table A.12 lists the fit indices for all of the individual MIMIC-models and Table A.13 shows the path coefficients between the

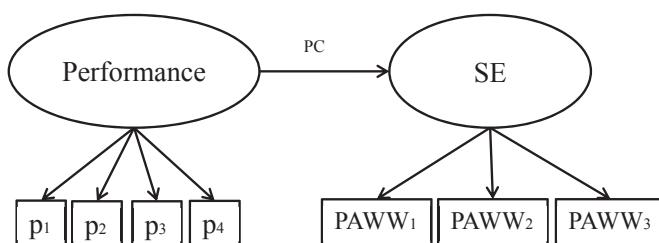


Figure A.3. Example single formative factor MIMIC-model for performance. The model depicts performance as a single formative indicator of sustainable employability (SE) and the three perceived ability and willingness to work (PAWW) items as reflective indicators of SE. PC represents the path coefficient to be estimated. Square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated

formative indicator and the simplified SE construct (i.e. 'PC' as shown in Figure A.2). As can be concluded from the tables, all formative indicators of SE show a significant correlation with SE, as estimated from the three PAWW items, but one.

Table A.12. Fit indices for single first-order factor MIMIC-models

| First-order factor | χ^2 | df | CFI | TLI | RMSEA | RMSEA 90% C.I. |
|--|----------|----|------|------|-------|----------------|
| 1. Subjective health (1 item) | 102.63* | 2 | .926 | .777 | .142 | .119 - .166 |
| 2. Need for recovery | 1355.16* | 76 | .902 | .883 | .081 | .078 - .085 |
| 3. Fatigue | 768.39* | 43 | .932 | .913 | .082 | .077 - .087 |
| 4. Work ability | 189.95* | 8 | .927 | .862 | .095 | .083 - .107 |
| 5. Skill gap | 420.63* | 53 | .876 | .845 | .052 | .048 - .057 |
| 6. Performance | 128.32* | 13 | .972 | .955 | .059 | .050 - .069 |
| 7. Employability (3 separate items) | 13.15* | 6 | .995 | .989 | .022 | .004 - .038 |
| 8. Motivation | 85.71* | 13 | .982 | .970 | .047 | .038 - .057 |
| 9. Job satisfaction | 67.88* | 8 | .979 | .960 | .054 | .043 - .067 |

Note. * = significant at $p < .05$

Table A.13. Path coefficients for the effects of first-order factors on the second-order factor employability consisting of three reflective indicator items in single first-order factor MIMIC-models

| First-order factor | Path coefficient | Standard Error | Est./S.E. | P-value |
|-------------------------------------|-------------------------|-----------------------|------------------|----------------|
| 1. Subjective health (1 item) | .374* | .028 | 13.463 | .001 |
| 2. Need for recovery | .424* | .021 | 20.402 | .001 |
| 3. Fatigue | .286* | .017 | 17.109 | .001 |
| 4. Work ability | .682* | .041 | 16.601 | .001 |
| 5. Skill gap | .208* | .025 | 8.247 | .001 |
| 6. Performance | .139* | .024 | 5.832 | .001 |
| 7. Employability (3 separate items) | | | | |
| 1) Job internal employability | .254* | .023 | 10.874 | .001 |
| 2) Firm internal employability | .063* | .024 | 2.587 | .010 |
| 3) External employability | .014 | .023 | .615 | .538 |
| 8. Motivation | .325* | .025 | 12.842 | .001 |
| 9. Job satisfaction | .279* | .026 | 10.668 | .001 |

Note. Reported path coefficients are standardized, transcribed from the Mplus 7 STDYX output;
 * = significant at $p < .05$

F. Results of an overall model including all of the formative indicators of SE as predictors of the three PAWW items

Complementary to the previous two model types, a single model was estimated in which all of the formative indicators of SE were directly related (i.e. without SE in between) to each of the three PAWW items. That is, effects of each formative indicator on the individual PAWW items were estimated controlled for all of the others (Figure A.4). This approach was included to complement the MIMIC model in estimating the viability of the formative indicators together as a set, while partitioning variance across items rather than over a single construct. In this model, fit indices and path coefficient size and significance were used to evaluate criterion validity.

All path coefficients between the formative indicators of SE and the three PAWW items are listed in Table A.14. As shown in the Table A.14, each of the formative indicators of SE is significantly related to at least one of the PAWW items, controlled for all of the other formative indicators of SE. Additionally, fit indices indicated that the model fit the data well ($\chi^2 = 3456.49$, $df = 1035$, $p > .01$, $CFI = .941$, $TLI = .933$, $RMSEA = .030$ (90% C.I. = .029 - .031)).

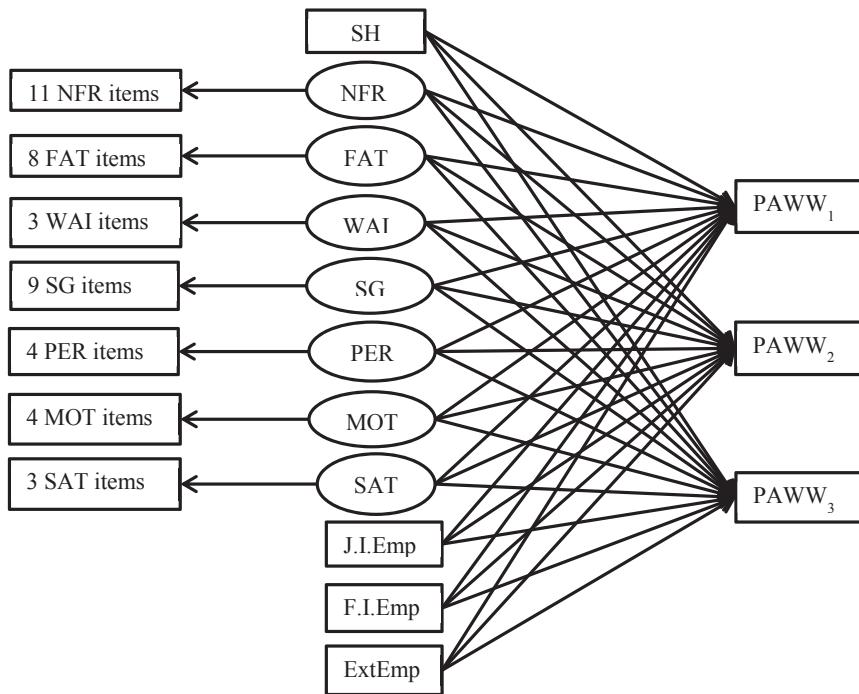


Figure A.4. Schematic depiction of the overall model including all of the formative indicators of SE as predictors of the three PAWW items. The model depicts all formative indicators of SE as predictors of the three PAWW items. Square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated from the items. All variables in the middle column are the formative indicators of SE. All variables in the right column are PAWW items. All variables in the left column are items corresponding to the latent formative indicators of SE. Abbreviations are intended as follows: 1) SH = subjective health; NFR = need for recovery; FAT = fatigue; WAI = work ability; SG = Skill gap; PER = performance; MOT = motivation; SAT = job satisfaction; J.I.Emp = job internal employability; F.I.Emp = firm internal employability; ExtEmp = external employability; PAWW = perceived ability and willingness to work until the official retirement age.

Table A.14. Path coefficients for the effects of each of the formative indicators of SE on the three PAWW items a full model incorporating all of the formative indicators of SE simultaneously

| Formative indicator of SE | Item 1: PMA | p | Item 2: PPA | p | Item 3: WILL | p |
|-------------------------------------|----------------|------|----------------|------|-----------------|------|
| 1. Subjective health (1 item) | -.017 | .455 | .080* | .001 | .003 | .915 |
| 2. Need for recovery | .189* | .001 | .147* | .001 | .084* | .018 |
| 3. Fatigue | -.010 | .800 | .138* | .001 | -.040 | .406 |
| 4. Work ability | .293* | .001 | .317* | .001 | -.020 | .657 |
| 5. Skill gap | .062* | .005 | -.015 | .523 | .029 | .228 |
| 6. Performance | -.008 | .669 | -.053* | .012 | .018 | .404 |
| 7. Employability (3 separate items) | | | | | | |
| 1) Job internal employability | .140* | .001 | .095* | .001 | .045* | .021 |
| 2) Firm internal employability | -.003 | .856 | .046* | .009 | .002 | .918 |
| 3) External employability | -.041* | .027 | -.050* | .006 | -.039 | .062 |
| 8. Motivation | -.072 | .061 | -.146* | .001 | -.041 | .369 |
| 9. Job satisfaction | .057* | .016 | -.033 | .179 | .230* | .001 |

Note. Reported path coefficients are standardized, transcribed from the Mplus 7 STDYX output;
 * = significant at $p < .05$; PMA = perceived mental ability item, PPA = perceived physical ability item,
 and WILL = Willingness to work until the official retirement age item

G. Results of two simplified MIMIC models including using one of the formative indicators of SE as reflective and the others as formative

To complement the previous three model types, we estimated a fourth more experimental type. That is, based on recommendations from the Mplus user forum (Muthén & Muthén, 2004), we estimated two simplified MIMIC models where not the PAWW items, but a single formative indicator was used as a reflective indicator of SE to achieve model identification (Figure A.5). Specifically, subjective health was used as a reflective indicator in these models because it was the only single item measure. In both versions of this model the factor loading for subjective health was estimated freely, while factor variance was fixed to zero. The difference between the two models was that the first did not include any constraints beyond the factor variance being fixed to zero, whereas the second constrained the paths of all formative indicators to have the same residuals. The latter model intended to model SE as a composite with equal weights for each of the indicators. In both models, indices of model fit (Diamantopoulos et al., 2008; Diamantopoulos & Winklhofer, 2001) as interpreted using conventional criteria (Hu & Bentler, 1999; MacCallum et al., 1996), the variance of the error term of the construct (Diamantopoulos et al., 2008; Diamantopoulos & Siguaw, 2006; Williams et al., 2003), and path coefficient size and significance were used to approximate validity.

Both the unconstrained model ($\chi^2 = 3218.703$, df = 930 p > .001, CFI = .942, TLI = .936, RMSEA = .031 (90% C.I. = .030 - .032) and the model with additional constraints ($\chi^2 = 3626.322$, df = 939 p > .001, CFI = .932, TLI = .925, RMSEA = .034 (90% C.I. = .032 - .035) fitted the data well. Path coefficients for the unconstrained model roughly followed a similar pattern as in the MIMIC-model, but in the constrained model all of the path coefficients were significant and in the expected direction (i.e. positive; Table A.15).

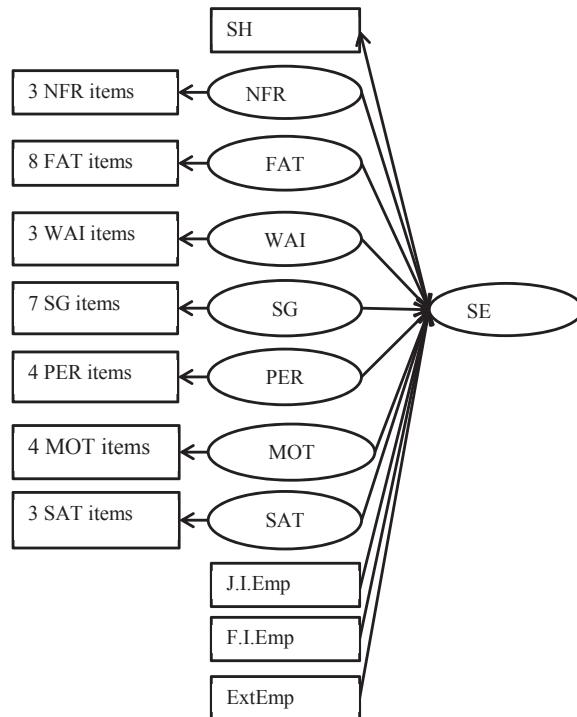


Figure A.5. Schematic depiction of the MIMIC model including one of the formative indicators of SE as reflective and the others as formative. Square boxes represent observed variables, whereas the ovals represent unobserved (latent or indirectly observed) variables as estimated from the items. All variables in the middle column are the formative indicators of SE. All variables in the right column are PAWW items. All variables in the left column are items corresponding to the latent formative indicators of SE. Abbreviations are intended as follows: 1) SH = subjective health; NFR = need for recovery; FAT = fatigue; WAI = work ability; SG = Skill gap; PER = performance; MOT = motivation; SAT = job satisfaction; J.I.Emp = job internal employability; F.I.Emp = firm internal employability; ExtEmp = external employability; PAWW = perceived ability and willingness to work until the official retirement age.

Table A.15. Path coefficients of the purely formative measurement models of sustainable employability consisting of the nine factors in an unconstrained and constrained format

| First-order factor | Unconstrained model | p | Constrained model | p |
|-------------------------------------|----------------------------|----------|--------------------------|----------|
| 1. Subjective health (1 item) | .601* | .001 | .547* | .001 |
| 2. Need for recovery | -.091 | .054 | .105* | .001 |
| 3. Fatigue | .893* | .001 | .167* | .001 |
| 4. Work ability | .460* | .001 | .437* | .001 |
| 5. Skill gap | -.107* | .001 | .026* | .001 |
| 6. Performance | .007 | .785 | .100* | .001 |
| 7. Employability (3 separate items) | | | | |
| 1) Job internal employability | .012 | .645 | .152* | .001 |
| 2) Firm internal employability | .012 | .671 | .137* | .001 |
| 3) External employability | .095* | .001 | .139* | .001 |
| 8. Motivation | -.132* | .029 | .165* | .001 |
| 9. Job satisfaction | -.179* | .001 | .124* | .001 |

Note. Reported path coefficients are standardized, transcribed from the Mplus 7 STDYX output;
 * = significant at p <.05

H. Conclusion regarding the models in this supplement

The results show that all models fit the data well. As such, it may be tempting to posit the question which model is preferred. However, none of the presented models should necessarily be preferred over the others; each model has its own advantages and disadvantages and all models should be considered complementarily. It is together that they provide insight in how indicators of a formative construct such as sustainable employability work as a set and in terms of criterion validity. Consequently, together they suggest that the approach of measuring sustainable employability as a formative construct consisting of subjective health, need for recovery, fatigue, work ability, job satisfaction, motivation to work, job performance, employability, and skill-gap, works. Moreover, together these models can be applied to various other constructs that have been treated as reflective, while they are in fact of a formative kind. Below we briefly describe the unique contribution and drawbacks of each model.

The MIMIC-model (as described in the paper and this supplement in section (D)) has the main advantage that it simultaneously assesses criterion validity and the viability of modeling the formative indicators of SE together as a set. However, this model suffers from two problems. First, the model relies heavily on the variables that are used as reflective indicators. This dependency can hardly be avoided because the construct under study needs to be assigned some observed variable for scaling. However, it is problematic because if inappropriate reflective indicators are chosen, there is no clarity regarding the conclusions drawn from the model. By using reflective indicators that capture perceptions of long term employability, which theoretically should be an outcome of sustainable employability, we have tried to maximize the appropriateness of our chosen indicators. Second, paths from the formative indicators to the construct are all estimated simultaneously. Consequently, indicator-construct path coefficients are estimated while controlling for all of the formative indicators. This may render some path coefficients insignificant and distort their effects, which may suggest that they are not relevant as indicators of the formative construct. That conclusion could, however, be false as such indicators could still be theoretically relevant.

The second model type (as discussed in section (E) of this supplement) including each formative indicator as a separate indicator of the construct as estimated from the reflective observed PAWW items addresses the second of the issues with the aforementioned MIMIC model. That is, in these more concise MIMIC models,

paths from the formative indicators to the criterion construct are estimated separately, so that their coefficients are not distorted by controlling for the other indicators. In combination with the first MIMIC model, these models thus serve to provide more insight into the criterion validity of each of the formative indicators used. Similar to the main MIMIC model, however, their dependency on the chosen reflective indicators remains problematic. Moreover, the models do not include the full formative construct as intended.

The third model type (as discussed in section (F) of this supplement) involved a relatively straightforward structural equation model. In this model, each of the reflective indicators used for the sustainable employability construct is regressed on all of sustainable employability's formative indicators. The purpose of this model is to assess criterion validity of each of the formative indicators while controlling for the others, but also while taking into account the potential formative nature of the reflective indicators used in the MIMIC models. It is instrumental to include this model-type in a complete analysis of a formative construct, because it is arguably hard to defend that the reflective indicators chosen are in fact reflective (as we are dealing with a formative construct in the first place). This provides additional information on the criterion validity of each of sustainable employability's formative indicator. However, this model's validity still depends on the appropriateness of the criterion variables chosen. Additionally, the model does not directly model the formative construct we aim to study.

Finally, the fourth model-type (as discussed in section (G) of this supplement) aims to circumvent the dependency on the reflective indicators chosen for the previous models. That is, this model-type involves only the formative indicators of sustainable employability, but uses one of these indicators as a reflective indicator to provide the formative construct with scaling to create an identifiable model. Meanwhile the factor variance is set at zero to enable estimating all paths freely (i.e. in the first variant of this model-type we fitted) or constrained equal (i.e. in the second variant of this model-type). These complementary variants provide information in the raw path coefficients and from the indicators to the formative construct, and the constrained equal variants (assuming equal importance of each indicator). The drawback of this model, however, is that it does not allow modelling all indicator construct paths formatively, as they technically should be modeled.

From this discussion it is clear that each of the models fitted truly complements the others in addressing a different issue, but also with different drawbacks. Therefore, as we aim to stress throughout this supplement but also in our paper, these models should all be considered to draw conclusions regarding the validity and viability of any formative construct under study. Finally, by making all of these models publicly accessible, we hope to provide researchers with relatively accessible to handle the complexity associated with formative constructs.

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Valorization addendum



Sustainable employability is invented to address important issues regarding extended working lives and peoples' long term abilities to work within the current societal and temporal context. As such, the way in which aspects of this dissertation can be transformed into societal value – or 'valorized' – is quite straightforward and has largely been discussed in previous chapters already. The present addendum discusses some of the ways in which aspects of this dissertation can be, and already have been, implemented to create value for both organizations and their employees. Most notably these include: i) an improved understanding of the currently highly relevant topic of sustainable employability; ii) a better way of monitoring the drivers of employees' long term ability to function at work and in the labor market; iii) a more nuanced picture of how age relates to sustainable employability; iv) foundations for interventions to improve healthcare employees' sustainable employability; and v) on a less formal note, a basis for a dictionary for interdisciplinary communication.

The first way in which the present dissertation may add value is by creating an improved understanding of the topic of sustainable employability. Currently, organizations can be observed to try and contribute to their employees' sustainable employability, but typically start monitoring workload or workers' health, whereas other organization do not know where to start. For example, sustainable employability is frequently approached as if it is synonymous with vitality. Consequently, interventions directed at improving vitality are implemented to stimulate sustainable employability. Examples of such interventions could include providing employees with gym memberships, implementing exercise breaks at work, and putting more healthy food options in the canteen. Alternatively, organizations can be observed to mainly focus on upskilling and lifelong learning as a means to sustain employability. For example, organizations might provide general employability oriented training or training vouchers that could contribute to employees' internal and external labor market attractiveness. Although these initiatives could arguably indeed contribute to sustainable employability, they target single aspects of sustainable employability and typically with a short term focus. As can be inferred from this dissertation's findings and chapters, however, addressing sustainable employability necessitates a more structural and integrative approach. That is, rather than simply addressing health or competence aspects separately, interventions should consider the ability to remain functioning at work and in the labor market as a whole. Moreover, interventions should ideally target structural working conditions (e.g. task variety) or processes (e.g. interpersonal interactions), as it is these components that relate most strongly to sustainable employability (aspects).

In specification of the first way in which this dissertation adds value, organizations aiming to improve sustainable employability of their employees should arguably use a thorough needs-assessment rooted approach. That is, to identify the structural conditions or processes that need to be changed, organizations should use an integral scan to identify bottlenecks and key issues that need to be addressed. Recognizing the relevance of *actual* implementation for valorization, it is worthwhile mentioning that this approach is currently being implemented in the 4Limburg program. Several organizations in the province of Limburg are participating in trajectories consisting of initial stakeholder interviews, a general sustainable employability survey, and in-depth qualitative explorations of identified issues (Rutten, 2018). These trajectories serve to help organizations in optimizing the status-quo regarding sustainable employability. As the foundation of these trajectories partly lies in the present dissertation (e.g., the case study described in the first chapter of this dissertation and the indicators used throughout the dissertation), actual societal impact has already been realized.

A notable example of such a trajectory has been implemented at Maastricht University, where the Maastricht University Sustainable Employability Monitor (UM-SEM) has been developed to identify key issues with regard to sustainable employability, inclusiveness, and work pressure (Aarts, Fleuren, de Grip, and Zijlstra, 2019). The extensive questionnaire used to survey employees of Maastricht University was designed on the basis of the indicators and the conceptual model that were developed as part of this dissertation. Importantly, the approach of the UM-SEM is not only to detect and signal issues, as the UM taskforce for sustainable employability will translate the findings to actual improvements. In order to do so, action and solution-oriented focus groups are used to go from finding, to sense making, to actionable policies and interventions. Moreover, the findings of the UM-SEM have been shared with the entire UM-community, both in the form of reports and several presentations for stakeholders on various levels in the UM (i.e. the board, university council, deans and directors, HR director and staff and employees), providing them with information and directions for improvement. Thereby this extensive approach will constitute a very concrete form of valorization in terms of sustainable employability, work pressure, and inclusivity improvements, but also in terms of aligning UM's HR policy to the expertise available within the university. A good example of how UM could save on high costs of external consultants.

The second form of valorization pertinent to this dissertation lies in the directions it may provide for monitoring sustainable employability or functioning at work in general. That is, the present dissertation provides insights into which indicators of functioning and sustainable employability are relevant. Moreover, recognizing sustainable employability as a longitudinal concept may push organizations to consider functioning on the long – rather than the short – term. The aforementioned projects could constitute practical examples of improved monitoring, with the addition that they should ideally include follow-up measurements on the individual level. As privacy is an obvious concern with such measurements, this notion has not materialized yet. Consequently, to fully valorize the ideas developed in the present dissertation, it may be worthwhile to consider the possibility of developing a longitudinal monitoring tool for sustainable employability to fruition. A particularly fruitful way could lie in developing a service that guarantees data security and privacy while simultaneously offering adequate longitudinal monitoring of sustainable employability and relevant constructs. Organizations would then be able to more effectively monitor employees (although not in ways that allow for data to be traced to individuals) so that interventions that could improve employees' sustainable employment can be designed more adequately.

A third way in which this dissertation's findings can be valorized pertains to improved well-being of certain groups of employees in particular. That is, the fifth chapter of this dissertation shows that sustainable employability is not strongly age related. Consequently, the stereotype that older employees would be less capable of functioning at work could arguably be weakened further. Similarly, as there are only very limited age effects on sustainable employability there is also no indication that particularly younger employees would function less well. Although these ideas do not connect to immediate material value, it may indirectly contribute to well-being and happiness of older employees in the workplace. Moreover, in the second and third chapter, this dissertation explicates the notion that sustainable employability as a concept should be approached in such a way that it generalizes to unemployed individuals. That is, particularly those who are unemployed (or subgroups thereof) could represent an important potential in terms of labor market participation and, thus, potential economic welfare. Relatedly, for individuals belonging to this group extra facilitation of their participation in labor could provide them with more equal opportunities to achieve sustainable employment. Obviously, future research on how this facilitation should actually and most adequately be provided is needed.

Nonetheless, appreciating the social and individual value of inclusiveness, these potential indirect forms of valorization should be recognized as well.

As a fourth form of valorizations, Chapter 6 provides healthcare organizations with relevant pointers on how to improve or safeguard their employees' sustainable employability. That is, several aspects, predominantly in the psychosocial domain of working, have been identified as predictors of (aspects of) sustainable employability. Healthcare organizations could use these employment characteristics as points for intervention. Of course healthcare organizations would do well to verify whether these predictors are particularly relevant to their current organizational context (i.e., if things are going well with regards to a specific predictor there may be less need to intervene). Nonetheless, the predictors as identified in chapter 6 may provide a good starting point that also moves organizations away from considering predominantly vitality alone. This form of valorization may provide a positive contribution to both the welfare of healthcare employees and the organizations employing them.

As the fifth and final form of valorization, this dissertation could constitute a first step in the development of a dictionary for interdisciplinary communication. That is, this dissertation is the fruit of an extensive interdisciplinary project that bundles insights from Occupational Epidemiology, Labor Economics, and Work and Organizational Psychology. The communicative expertise developed through interdisciplinary differences in terms could be materialized in the form as a dictionary. This would be to great benefit of researchers engaging in future interdisciplinary projects. As there is much to be gained from combining insights from multiple disciplines, it is difficult to put a number on the value that can be achieved with a dictionary like this.

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Curriculum vitae

Bram Fleuren was born in Milsbeek, The Netherlands on 02-02-1989. He grew up in this small village and completed elementary school there. Bram went to high school at Stedelijk Gymnasium Nijmegen, from which he graduated in 2007 with a Nature and Health profile. He then studied Law and Business for 6 months at Leiden University, but decided to discontinue this program to study Psychology instead. In 2008 he started his Bachelor Psychology and Society at Tilburg University from which he graduated with distinction in 2011. He continued studying at Tilburg University by pursuing a Master in Social Psychology track Work and Organizational Psychology from which he graduated cum laude in 2012. After his master, Bram worked as junior consultant in recruitment at HR consultancy firm BeteoR in Eindhoven until early 2014. He then moved to the PhD project 'Sustainable employability of healthcare employees' at Maastricht University that resulted in the present dissertation. As of March 2019, Bram has been happily working as Assistant Professor in the department of Work and Social Psychology at Maastricht University's Faculty of Psychology and Neuroscience.

