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RESEARCH ARTICLE

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Work ability, inclusion, and human resource development of disabled people

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ABSTRACT

Our study focuses on the relationship between the work ability, inclusion, and human resource development of disabled people. It also explores the determinants and outcomes of their work ability and researches the benefits of an inclusive human resource management of disabled people. The study provides four main contributions on disability inclusion. Firstly, it compares the determinants of the work ability of disabled and non-disabled people by analysing a huge dataset. The results are indicative of the need for an inclusive human resource management of disabled people. Secondly, we focus on the inclusion perceived by disabled people themselves. The self-perceived improved inclusion of disabled people improves their work ability. Thirdly, we adopt an interdisciplinary approach to disability, which contributes in developing a comprehensive human resource development framework aimed at empowering individuals with disabilities. Finally, our study explores the relationship between the work ability, inclusion, and human resource development of disabled people, examining the determinants and outcomes of their work ability. The improved work ability of disabled people leads to their improved employability, paving the way for disability inclusion in the workplace.

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Disabled people; human resource development; inclusion; work ability; inclusive human resource management

1. Purpose of our study

The number of people with disabilities has increased worldwide to an estimated 1.3 billion (WHO, 2022, 2023), of whom about 80% are of working age (ILO, 2023). Due to various attitudinal, physical and informational barriers it is challenging for disabled people to find equal employment opportunities (ILO, 2015a, 2023). Yet equal access to decent work is both a human right and an economic necessity for all, regardless of disability (Ghai, 2002, 2003, 2005, 2006; ILO, 2015b). Decent work is defined by the International Labour Organization (ILO, 2015b, p. 157) as a 'productive work in which rights are protected, which generates an adequate income, with adequate social protection'.

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The United Nations Convention on the Rights of Persons with Disabilities (CRPD) defines people with disabilities as 'those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others' (United Nations, 2006). Currently, neurodiversity is being increasingly acknowledged in the workplace. Neurodiversity is the idea that neurological differences like autism and ADHD are the result of normal, natural variations in the human genome (Austin & Pisano, 2017). As health can be defined as 'a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity' (WHO, 1948, p. 1), the concept of disability is complex, dynamic, multidimensional, and contested (WHO & The World Bank [WHO], 2011, p. 3). According to the International Classification of Functioning, Disability and Health (ICF), functioning and disability arise from a dynamic interaction between health conditions and contextual factors, both personal and environmental (WHO, 2011, pp. 4–5). It is called 'the bio-psycho-social model' and is increasingly globally accepted. The mismatch between health conditions and contextual factors often denotes a disability that frequently results in unemployment, exclusion, and poverty (WHO, 2011, pp. 235–236).

The International Labour Organization (ILO) suggests improving the employability of people with disabilities and promoting disability inclusion at work (ILO, 2015a, 2015b, 2023). Disability inclusion refers to promoting and ensuring the participation of people with disabilities in education, training, and employment and all aspects of society and providing the necessary support and reasonable accommodation so that they can fully participate (ILO, 2015a, p. 1). The importance of disability inclusion has also been emphasised by academic researchers (Jonsen et al., 2021; Kwon, 2021, 2024; Lengnick-Hall et al., 2008; Pérez-Conesa et al., 2020; Schloemer-Jarvis et al., 2022). According to Lengnick-Hall et al. (2008) and Kwon (2024), it is a significant societal loss if we fail to develop and utilise the diverse untapped human resources, one such resource being people with disabilities. Pérez-Conesa et al. (2020) investigate which elements, linked to HR management, facilitate disability inclusion; they conclude that having a strategic plan for the normalisation of disability in the work environment effectively leads to high levels of inclusion. Based on a systematic literature review, Schloemer-Jarvis et al. (2022) find that HR practices have been identified as a primary enabler of disability inclusion. Jonsen et al. (2021) examine the websites of 75 major companies in five different countries (France, Germany, Spain, the UK, and the US), and find that a focus on inclusion seems particularly beneficial to appear as an employer of choice.

Our study suggests that the work ability, the inclusion perceived by disabled people themselves and human resource development (HRD) are three important elements for promoting disability inclusion. We endeavour to clarify the link between the work ability, inclusion, and human resource development of disabled people. We also explore the determinants and outcomes of the work ability of disabled people, and research the benefits of an inclusive human resource management (HRM) of disabled people. An inclusive HRM perspective acknowledges the value of the peripheral and outsiders of the labour market, such as disabled people (Freese & Borghouts - van de Pas, 2021; van den Groenendaal et al., 2023). It invests in the participation, knowledge, skills, and sustainable employability of people who do not yet or only temporarily work in an organisation (Borghouts - van de Pas & Freese, 2017; Freese & Borghouts - van de Pas, 2021). Our

study provides a theoretical contribution on disability inclusion from the perspective of work ability, inclusion perceived by disabled people themselves, and human resource development.

The structure of this article is as follows. We first review the literature on the work ability, inclusion, and human resource development of disabled people. Secondly, we present our research methods and the data we use. Thirdly, through statistical analysis, we investigate the relationship between the work ability, inclusion, and human resource development of disabled people and identify the determinants and outcomes of their work ability. Finally, we outline our contributions and the implications of our results for implementing an inclusive human resource management of disabled people.

2. Theory and hypotheses development: work ability, inclusion, and human resource development of disabled people

Having more qualified and talented people with disabilities is beneficial to organisations, as it provides opportunities not only to broaden understanding and appreciation of human differences, but also to leverage the unique skills and perspectives of these individuals for organisational creativity and innovation (Kwon, 2024). An organisation's driver for disability inclusion must transcend monetary values, and instead centre on a humanist philosophy, which eventually improves employee engagement and organisational performance (Kwon, 2024). It is a significant societal loss if we fail to develop disability inclusion. Therefore, we have to develop the diverse untapped human resources that are disabled people. In this context our study focuses on the work ability, inclusion, and HRD of disabled people who are in a weak position in the labour market.

We adopt an interdisciplinary approach to disability, which contributes in developing a comprehensive HRD framework aimed at empowering individuals with disabilities. Disability is the umbrella term deployed for impairments, activity limitations, and participation restrictions, referring to the negative aspects of the interaction between an individual (with a health condition) and the individual's contextual factors (environmental and personal factors) as outlined by the International Classification of Functioning, Disability and Health (ICF) (WHO, 2001, 2011). To understand disability according to the bio-psycho-social model, we have to explore not only the body functions and structures from the perspective of medical science, but also personal factors from the perspective of psychology and motivation, and also environmental factors from the perspective of education, training, employment, and social support systems. A person's environment in particular has a huge impact on the experience and extent of their disability because inaccessible environments strengthen disability by creating barriers to participation and inclusion (WHO, 2011). Therefore, we review the literature on disability in the fields of medical science, psychology, organisational behaviour, welfare, public and occupational health, occupational rehabilitation, management, especially human resource management, and human resource development to understand disability and develop our set of hypotheses.

The concept of work ability was defined in 1981 in a follow-up study on ageing employees (Ilmarinen & Tuomi, 1992; Ilmarinen et al., 2005; Tuomi et al., 1997). Population and work force ageing were the main reasons for starting work ability

research in the early 1980s, and a comprehensive occupational health research was developed by the Finnish Institute of Occupational Health (FIOH) (Ilmarinen, 2019).

The definition of work ability is 'how good a worker is at present and will be in the near future, and how they are able to do their work with respect to their work demands, and their health and mental resources' (Ilmarinen & Tuomi, 1992, p. 8; Ilmarinen et al., 2005, p. 3). To measure work ability, the Work Ability Index (WAI) was developed and its validity was tested by clinical examinations and by follow-up inquiries over a period of 11 years (Ilmarinen, 2007, 2019; Ilmarinen et al., 2005). Since its creation, the use of the WAI both in research and practice has spread to many countries, and the index has been translated into 24 languages.

Between 2000 and 2009, the 'work ability house' concept was created based on the Finnish National Survey of work ability (Gould et al., 2008; Ilmarinen, 2019). The house consists of four floors: the first floor represents health, and the second, third and fourth floors represent competence, values, and work respectively (Ilmarinen, 2019; Ilmarinen et al., 2005). The floors of the house, as well as family and social networks, indicate dimensions that affect work ability (Ilmarinen, 2019). In the work ability house model, the first floor (health and functional capacities) and the fourth floor (work, work environment, work community, and management) indicate the most significant connections with work ability, although the importance of competence, values and attitudes, and other life-related dimensions are also confirmed (Ilmarinen, 2019; Ilmarinen et al., 2005). Thus, the work ability has a complex structure including human resources, the characteristics of the work, as well as factors outside the working life (Ilmarinen et al., 2005).

Several studies have shown that possessing a higher educational level improves the opportunities for employment of disabled people. Educational level is a predictive factor for employment: not only is a higher educational level reached by the young disabled positively associated with employment (Burker et al., 2004; Nagarajan et al., 2003; Packham & Hall, 2002; Valtonen et al., 2006) but a higher parental educational level (Ireys et al., 1996) also is. By analysing the pathways into working life for people with mobility disabilities, Solstad Vedeler and Mossige (2010) suggest higher education as a key factor for a smooth transition into the labour market. Achterberg et al. (2009) systematically review the factors which promote young disabled people entering the labour market and conclude that education is important among the promoting factors. Therefore, we are going to investigate the effects of educational background on the work ability of disabled people by using a large dataset which has been made available to us. Our first hypothesis is that:

Hypothesis 1: The educational background of disabled people determines their work ability.

Achterberg et al. (2009) also find in their systematic review that several physical functioning obstructions are hindering factors. Zyznawska et al. (2013) find that by regular physical training disabled people are in better physical condition, gain self-confidence, and become more active in social and professional terms. Disabled people participating in sports score better on the general work ability scale as well as on the ability scale that pertains to the specific requirements of particular jobs, than disabled people who are not involved in sports. We thus hypothesise that:

Hypothesis 2: The physical functioning of disabled people determines their work ability.

The second floor of the 'work ability house' concept representing competence, work experiences, and learning also impacts work ability (Ilmarinen, 2019; Ilmarinen et al., 2005). Therefore, our study considers to what extent human resource development may influence the work ability of disabled people. Human resource development is defined as the acquisition of knowledge and skills that may be used in the present or in the future, the preparation of individuals to enrich an organisation in the future, and the act of being involved in many different types of training activities (Fitzgerald, 1992, p. 81). Human resource development has a broader and a more long-term focus compared to mere training. It helps people face new challenges and ensures the long-term development of an organisation. HRD is a process for developing and unleashing human expertise through organisation development, and personnel training and development for the purpose of improving performance; HRD consists of two major components which are training and development, and organisation development (Swanson, 1995, p. 208). Human resource management, on the other hand, can be defined as a strategic, integrated, and coherent approach to the employment, development, and well-being of the people working in organisations (Armstrong & Taylor, 2014, p. 5), and is the process of acquiring, training, appraising, and compensating employees, and of attending to their labour relations, health and safety, and fairness concerns (Dessler, 2017, p. 3). Therefore, HRD overlaps with a part of HRM, but the theoretical foundations of HRD are drawn from economics, psychology, and systems theory which is called the three-legged stool model (Swanson, 1995; Swanson & Holton, 2001). McLean (1998) suggests using the octopus or centipede model to describe the multidisciplinary field of HRD by using metaphors. Our study focuses on HRD, explores its effects on the work ability of disabled people, and makes recommendations for a more inclusive HRM in the future.

Pak et al. (2021) find that human resource developmental practices are positively related to work ability among employees aged 45 and over. Aittomäki et al. (2003) and Bugajska and Łastowiecka (2005) find that being provided with the opportunity to undertake training courses (human resource developmental practices) has a positive effect on perceived work ability. Braathen et al. (2015) explore self-perceived changes in work ability among persons attending occupational rehabilitation programs. Self-perceived changes in work ability are influenced by people's self-understanding and coping strategies, interaction with the workplace, support, or lack of support from actors outside the workplace, and social insurance regulations. These dimensions are intertwined, influencing each other both during and after occupational rehabilitation.

Human resource development is also very important for promoting diversity and inclusion (Futagami, 2020). Human resource development is at once a source of the psychological contract-related beliefs on the part of employees as well as a central means by which these beliefs are fulfilled (Rousseau, 2024). Diversity training builds a common understanding of the value of diversity, assisting in building social cohesion so that it improves individual and organisational outcomes (Shen et al., 2009). Richard and Kirby (1999) suggest that justified diversity programs result in positive general attitudes and opinions. In particular, mentoring and coaching are important tools for developing

female and minority employees (Futagami, 2020; Ragins, 2002; Ragins & Scandura, 1994), and are other strategies for managing diversity (Shen et al., 2009).

Human resource development, through vocational education and training (VET), is an important avenue for improving work-related skills and it also plays an important role in assisting disadvantaged members of society, including those with a disability (Ferrier & Smith, 2010). Preston and Green (2008) also argue that VET may contribute to the reduction of educational inequalities, thus enhancing social inclusion and cohesion. Pereira et al. (2016) emphasise that poor access to VET and the lack of options for learners with Special Educational Needs (SEN) and those with a disability, make it even more difficult to access economic activities in an open labour market. They thus regard VET as a pathway to employment for learners with SEN and disabilities. Nevala et al. (2019) conclude that the employment of people with intellectual disabilities can be improved through secondary education including proper teaching methods and personal support services, supported work, workplace accommodation, and support from family and employers. Human resource development is seen as a potentially powerful tool for fostering social inclusion (Nilsson, 2010). Learning disabilities are common among employees and an important topic for organisations, and they have important training and development-related implications in respect of human resource development (Selseleh et al., 2025).

Kwon (2024) also suggests that HRD can bridge disability and business, and HRD professionals can take practical actions to make disability visible and incorporated into our educational institutions, workplaces, and communities. He thus calls for a move towards a learning culture that fosters humanness in organisations, where disability is embraced and supported as one of many forms of human diversity. Therefore, we empirically investigate the effect of human resource development on the work ability of disabled people. We thus hypothesise that:

Hypothesis 3: The work ability of disabled people is improved by human resource development.

Inclusion is a core component concept of the 17 Sustainable Development Goals (SDGs) adopted in 2015 by the United Nations (UNDP, 2023; United Nations, 2015). The Heads of State and Government and High Representatives, meeting at the United Nations Headquarters in New York in 2015, made a promise that 'no one will be left behind' and envisaged 'a world in which every country enjoys inclusive and sustainable economic growth and decent work for all' (United Nations, 2015, pp. 3–4). Notably, Goal number 10 aims to 'empower and promote the social, economic, and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion, or economic or other status' by 2030 (United Nations, 2015, p. 21).

Inclusion too has different definitions. According to Miller and Katz (2002), inclusion is a sense of belonging, feeling respected, valued for who you are, and a feeling of support and commitment from others so that you can do your best. Mor Barak and Cherin (1998) define inclusion-exclusion as 'a continuum of the degree to which individuals feel a part of critical organizational processes such as access to information and resources, involvement in work groups, and ability to influence the decision-making process' (p. 57). Therefore, inclusion-exclusion is presented as a major outcome variable of the

interaction between the personal dimension and organisational dimension (Mor Barak, 2000a, 2000b).

According to Shore et al. (2011, p. 1265), inclusion is defined as 'the degree to which an employee perceives that he or she is an esteemed member of the work group through experiencing treatment that satisfies his or her needs for belongingness and uniqueness'. A feeling of inclusion is a person's perception of high belongingness and high uniqueness, while the opposite, a feeling of exclusion results from perceiving low belongingness and low uniqueness. The competing mechanisms of self-perceived uniqueness and a sense of belonging to an organisation intertwine into a perception of inclusion (Nishii & Leroy, 2022). As such, it emerges that inclusion is a more advanced concept than diversity because inclusion moves beyond counting demographic differences, to showing how these demographic differences can make a difference if people are working together to achieve organisational objectives (Futagami & Kettunen, 2022; Roberson, 2006; Shore et al., 2011).

Van den Brink and Benschop (2014) discuss gender inclusion; Ozturk and Tatli (2016), Fletcher and Marvell (2023) and Lin and Chang (2024) examine LGBT inclusion, so as to focus on the minorities in management and develop an inclusive HRM. Farndale et al. (2015) consider gender, age, and nationality as three inclusion themes, while Pérez-Conesa et al. (2020), Jonsen et al. (2021) and Schloemer-Jarvis et al. (2022) investigate the inclusion of people with disabilities to contribute to an inclusive HRM. As already mentioned, Pérez-Conesa et al. (2020) suggest that having a strategic plan for the normalisation of disability facilitates high levels of inclusion. Schloemer-Jarvis et al. (2022) conclude that HR practices facilitate disability inclusion.

The concept of inclusion matters here because prolonged unemployment of disabled people may also lead to social exclusion. The concept of 'social exclusion' originally popularised by René Lenoir (1974) has become one of the most important themes of contemporary social debate. Focusing on social exclusion can help in analysing poverty and deprivation (Sen, 2000). Inclusion means that 'a person feels they are a significant part of an entity with others' (Wikström et al., 2020, p. 2). Inclusion is a process that can be observed through material, spiritual, social, and physical dimensions and can be viewed from a variety of perspectives, such as education or work (Leemann et al., 2015, 2022; Wikström et al., 2020). However, some disabled people feel not only not being part of a work group, but also not even part of society (Futagami et al., 2017). Hennekam et al. (2023) endorse Bourdieu's concepts of social, cultural, economic, and symbolic capitals as providing a useful lens to study inequalities in the labour market, as they reveal the social structures that produce, sustain, and reinforce the social order, including when it disadvantages individuals with mental illness. Leemann et al. (2015) summarise the multidimensionality and different perspectives of social inclusion as 'being a dynamic process that enables participation in society, provides possibilities and resources, and enhances capabilities' (p. 5). Leemann et al. (2022) conducted a survey on a sample in which most of the persons involved were affected by or at immediate risk of social exclusion. On the basis of this survey, they developed the 'experiences of social inclusion scale' (ESIS). The items were formulated by experts from the Finnish Institute for Health and Welfare and the University of Jyväskylä. The mean score on the ESIS was not statistically significantly different between male and female

respondents, whereas a statistically significant difference for experiences of poverty was found (Leemann et al., 2022). These concepts of social exclusion by Sen (2000) and social capital theory by Bourdieu (1986) are indicative of the need to understand the inclusion of disabled people in the periphery or the outsides of the labour market in the context of an inclusive HRM. As we focus in this study on the inclusion of disabled people who are in a weak position in the labour market, we hypothesise that:

Hypothesis 4: Disabled people perceive lower inclusion compared to non-disabled people.

According to the work ability house model by Ilmarinen et al. (2005, 2019), the third floor representing values and attitudes such as inclusion is also important for work ability. Cho and Mor Barak (2008) examine the relationships between diversity, inclusion, organisational commitment, and job performance. They suggest that when individual workers feel that their values and norms are supported and that they are treated fairly with inclusion in various organisational processes, their sense of commitment increases and their job performance improves. They conclude that perceptions of inclusion predict both organisational commitment and job performance. Shore et al. (2011) also suggest that self-perceptions of inclusion lead to outcomes such as job performance, job satisfaction, high-quality relations with group members and supervisors, intention to stay, organisational citizenship, organisational commitment, well-being, creativity, and career opportunities for diverse individuals. In order to investigate the effects that inclusion of disabled people will have on work ability, we hypothesise that:

Hypothesis 5: The inclusion of disabled people leads to their improved work ability.

There is an increasing international interest in the concept of positive mental health and its contribution to all aspects of human life (Tennant et al., 2007). Mental health is described by WHO (2004, p. 10) as 'a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community'. Positive mental health is the foundation for the well-being and effective functioning for an individual and for a community (WHO, 2004, p. 10). Tennant et al. (2007) developed the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) based on the WHO's concept. We thus hypothesise that:

Hypothesis 6: The mental well-being of disabled people leads to their improved work ability.

Heckman (2008) states that skills beget skills and capabilities foster future capabilities and estimates the evolution of cognitive and non-cognitive skills. Cognitive and non-cognitive skills are important determinants of schooling and socioeconomic success. He emphasises the importance of support in the skill formation of disadvantaged children. Koskinen et al. (2012) developed the scale for cognitive function skills. We thus hypothesise that:

Hypothesis 7 : The work ability of disabled people is improved by upgrading their skills.

If disabled people can improve their work ability, they are more likely to carry out the tasks and actions required to engage in work and employment (WHO, 2001). In other words, disabled people can realise decent work by improving their work ability, thus promoting disability inclusion in the world of work (ILO, 2015a, 2015b, 2023). Therefore, we hypothesise that:

Hypothesis 8: The improved work ability of disabled people leads to their improved employability.

3. Research methods

3.1. Time of survey and data

The survey was conducted by the Finnish Institute of Occupational Health (FIOH) from April 2017 to the end of December 2022 as European Social Fund (ESF) Priority 3 and Priority 5 projects. Priority 3 projects target young people and other groups who are in a weak position in the labour market and Priority 5 projects target people outside working life due to disabilities and other health problems (Wikström et al., 2021). The organisations and institutes involved in the ESF Priority 3 and Priority 5 projects provide human resource development which includes vocational education and training, individual and group training, internship, mentoring, and coaching for individuals and groups, social interaction, rehabilitative work tasks, vocational rehabilitation, etc. for the targeted groups. Data were acquired from a self-perception survey, 'Abilitator (Kykyviisari)', that is, a patient-reported outcome measure on the work ability and functioning of people in a weak position in the labour market (Wikström et al., 2021). The Abilitator is a resource-oriented work ability mapping tool for the general, non-observable work ability-related aspects that should be considered when building one's path towards employment (Wikström et al., 2024). We have received permission to utilise and process the raw data from the Finnish Institute of Occupational Health (FIOH) for our study.

3.2. The questionnaire

The questionnaire in the survey includes questions on work ability, inclusion, employability, mental well-being, skills, and physical functioning.

Work ability is how good a person is able to do his or her work with respect to their work demands, and their health and mental resources at present and in the near future (Ilmarinen & Tuomi, 1992, Ilmarinen et al., 2005). The item in the questionnaire relates to work ability (e.g. Let us assume that your work ability would receive a score of 10 points at its best. What score would you give your current work ability?) and the score is measured on a 0–10- point scale. Employability is how a person feels in relation to work life and how equipped they currently are for employment, and about carrying out the tasks and actions required to engage in work and employment (WHO, 2001). The item in the questionnaire relates to employability (e.g. How do you feel in relation to work life at

the moment? Choose the number that best matches your situation such as 9 and 10: I have a job. I am well-equipped to continue in employment.) and the score is measured on a 0–10- point scale.

Inclusion is a process that can be observed through material, spiritual, social, and physical dimensions and can be viewed from a variety of perspectives, such as education or work (Leemann et al., 2015, 2022; Wikström et al., 2020) and means that a person feels they are a significant part of an entity with others (Wikström et al., 2020). Twelve items in the questionnaire relate to inclusion (e.g. I get help when I need it). Mental well-being means how good a person feels about the future and their mental health (Tennant et al., 2007), and nine items are in respect of mental well-being (e.g. I have been feeling optimistic about the future). Skills mean how good a person is able to take in new knowledge and learn new skills (Koskinen et al., 2012), and ten items in the questionnaire are related to skills (e.g. I have skills that I can use in my work life). Physical functioning means how good a person's physical fitness is, which is the general physical endurance, as outlined by the ICF (Aromaa & Koskinen, 2004; WHO, 2001), and the item is about physical functioning (e.g. How is your level of physical fitness?). In respect of inclusion, mental well-being, skills, and physical functioning, the score is measured on a five-point scale.

3.3. Profile of the respondents

The total number of respondents is 6,214. Over half (52.4%) of them are male, 47.6% are female, 57.7% are under 40 years of age, and 42.3% are 40 years or over. Around a third, 32.6% of them have basic education, and 67.4% have at least secondary education, as Table 1 shows.

About two thirds, 65.5% ($n = 3{,}923$) of all respondents suffer from one or more prolonged (lasting at least six months) physical or psychological illnesses, symptoms, or injuries. Table 2 shows the profile of the non-disabled and disabled respondents.

We conduct a Chi-square test using SPSS 28.0 to examine the presence of a significant difference by gender, age, and education between the non-disabled and disabled respondents. Table 2 indicates the results of analysis by gender, age, and education.

In respect of gender, the female ratio (51.2%) of the disabled is significantly ($p < .001$) higher than that (41.6%) of the non-disabled, and in respect of age, the ratio of the disabled who are 40 years or over (46.8%) is significantly ($p < .001$) higher than that (34.8%) of the non-disabled. Such significant differences suggest that female and older disabled people are more likely to suffer from gender and age discrimination in the

Table 1. Profile of the respondents ($N = 6{,}214$).

		n (%)
Gender	Male	Female
	3,257 (52.4)	2,957 (47.6)
Age	Under 40 years of age	40 years of age or over
	3,583 (57.7)	2,631(42.3)
Education	Basic education	Secondary education at least
	1,899 (32.6)	3,930 (67.4)

Table 2. Profile of the non-disabled and disabled respondents.

	Non-disabled respondents n (%) (Total = 2,068)		Disabled respondents n (%) (Total = 3,923)		Chi-square value	DF	Φ
Gender	Male	Female	Male	Female	49.739***	1	0.091
	1,208 (58.4)	860 (41.6)	1,916 (48.8)	2,007 (51.2)			
Age	Under 40 years of age	40 years of age or over	Under 40 years of age	40 years of age or over	79.512***	1	0.115
	1,348 (65.2)	720 (34.8)	2,087 (53.2)	1,836 (46.8)			
Education	Basic education	Secondary education at least	Basic education	Secondary education at least	0.531	1	0.010
	659 (33.2)	1,328 (66.8)	1,226 (32.2)	2,579 (67.8)			

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 3. The impediment extents of one or more prolonged physical or psychological illnesses, symptoms, or injuries of the disabled respondents ($n = 3,923$).

				Share(%)			
	Mean	SD	Median	0–5 points	6–7 points	8–9 points	10 points
Leisure-time activities	5.02	2.818	5.00	53.8	23.5	18.8	3.8
Housework	4.18	2.979	4.00	63.0	21.2	13.1	2.7
Work or possible work	5.76	2.895	6.00	45.1	21.7	23.6	9.5
Personal relationships	3.88	3.083	4.00	66.9	17.6	12.7	2.7

labour market, compared with non-disabled people, and are thus placed in a vulnerable position. Our findings suggest the need to carefully consider the gender and age diversity of disabled people in the labour market.

In respect of education, there is no significant difference between the non-disabled and disabled respondents, with 32.2% of the disabled having a basic education, and 67.8% of them having at least secondary education. It shows almost similar percentages of both disabled and non-disabled people having basic and secondary education at least.

Table 3 shows the impediment extents of one or more prolonged physical or psychological illnesses, symptoms, or injuries of the disabled respondents for leisure-time activities, housework, work or possible work and personal relationships. In this questionnaire a zero rating indicates no impediment, and ten indicates the maximum possible impediment or huge impediment. A total of 54.8% of the disabled respondents feel the impediment extents slightly severe (over 6 points) for work, 46.1% for leisure-time activities, 37.0% for housework, and 33.0% for personal relationships.

4. Analysis and results

4.1. Analysis 1, on the determinants of the work ability of the non-disabled and disabled respondents

In Analysis 1, our study focuses on the determinants of the work ability of the non-disabled and disabled respondents. The determinants of the work ability of the non-disabled and disabled people are assumed to be their personal characteristics, namely, gender, age and

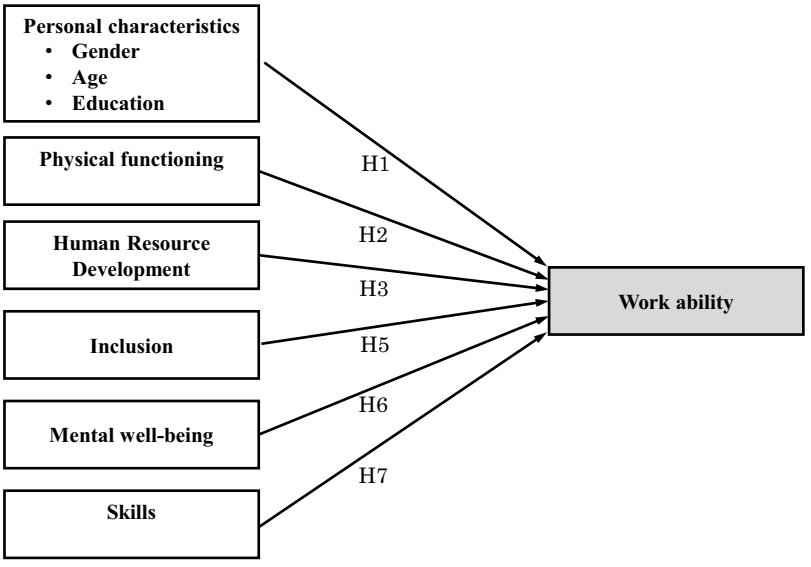

Figure 1. Determinants of the work ability model.

education, inclusion, mental well-being, skills, physical functioning, and human resource development, based on Hypothesis 1, 2, 3, 5, 6, and 7 and the contributions by such as Ilmarinen et al. (2005, 2019), Achterberg et al. (2009), Aittomäki et al. (2003), Zyznawska et al. (2013), Braathen et al. (2015), Nevala et al. (2019), Bugajska and Łastowiecka (2005), and Pak et al. (2021), as Figure 1 shows.

4.1.1. Common method variance

The common method variance is present if (a) a single factor emerges from the factor analysis or (b) one general factor accounts for the majority of the covariance among the measures, according to Podsakoff et al. (2003, p. 889). We conduct Harman's single factor test, namely exploratory factor analysis (no rotation and the extraction method is the maximum likelihood method) to check the presence of the common method variance by using SPSS 28.0. We find that six factors (eigenvalues are more than one) are produced from all variables and the percentage of variance with the first factor, the one referring to the highest eigenvalue, is 41.433%. Therefore, we confirm that there is no common method variance in our data.

4.1.2. Factor analysis and reliability analysis

Twelve items regarding inclusion are factor analysed (principal factor method and Varimax rotation) using SPSS 28.0, which produces two factors: (1) social inclusion ($\alpha = 0.901$) and (2) social functioning ($\alpha = 0.876$). Nine items regarding mental well-being are factor analysed (maximum likelihood method and Promax rotation), which produces one factor: mental well-being ($\alpha = 0.900$). Ten items regarding skills are factor analysed (principal factor method and Varimax rotation), which produces two factors: (1) cognitive functioning ($\alpha = 0.716$) and (2) work skills ($\alpha = 0.852$).

Table 4. Comparison of work ability, physical functioning, inclusion, mental well-being, and skills between the non-disabled and disabled respondents.

	Non-disabled respondents Mean (SD)	Disabled respondents Mean (SD)	Difference between the non-disabled and disabled respondents	t-value	95% CI LL a	95% CI UL b
Work ability	7.39 (2.014)	5.38 (2.521)	2.005***	36.300	1.903	2.106
Physical functioning	3.61 (1.023)	2.85 (1.034)	0.757***	31.277	0.710	0.804
Social inclusion	3.9221 (0.74565)	3.5433 (0.81000)	0.37872***	20.373	0.34320	0.41424
Social functioning	3.5381 (1.07430)	3.2601 (1.14510)	0.27800***	10.493	0.22708	0.32892
Mental well-being	3.6963 (0.65659)	3.3829 (0.67281)	0.31337***	19.803	0.28235	0.34439
Cognitive functioning	3.9028 (0.60678)	3.5832 (0.68943)	0.31963***	20.351	0.29002	0.34924
Work skills	3.9108 (0.76507)	3.6120 (0.80459)	0.29884***	15.994	0.26277	0.33490

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
a: 95% CI LL: Confidential Interval Lower Limit
b: 95% CI UL: Confidential Interval Upper Limit

4.1.3. Descriptive statistics and comparative analysis on work ability and inclusion between the non-disabled and disabled respondents

Table 4 shows the descriptive statistics on work ability, physical functioning, social inclusion, social functioning, mental well-being, cognitive functioning, and work skills of the non-disabled and disabled respondents. We conduct a t-test to examine the presence of a significant difference between the non-disabled and disabled respondents. Work ability, physical functioning, social inclusion, social functioning, mental well-being, cognitive functioning, and work skills are all significantly ($p < .001$) lower for the disabled respondents compared to the non-disabled ones (Table 4).

4.1.4. Multiple regression analysis

We conduct multiple regression analysis using SPSS 28.0 in order to identify the predictors that determine dependent variables, namely the work ability both of the non-disabled and disabled respondents. Independent variables are gender, age, education, social inclusion, social functioning, mental well-being, cognitive functioning, work skills, physical functioning, and human resource development. Gender (male = 1), age (persons who are under 40 years of age = 1), education (persons who receive secondary education at least = 1), and human resource development (persons who receive HRD, including vocational education and training, mentoring and coaching, etc. = 1) are dummy variables.

Table 5 shows the results of the multiple regression analysis. In respect of the non-disabled respondents, education (β = 0.092), social inclusion (β = 0.100), mental well-being (β = 0.127), cognitive functioning (β = 0.121), work skills (β = 0.200), and physical functioning (β = 0.251) significantly ($p < .001$) determine work ability. In respect of the disabled respondents, gender (β = 0.046), age (β = 0.070), social inclusion (β = 0.154), cognitive functioning (β = 0.133), work skills (β = 0.177), physical functioning (β = 0.324) and HRD (β = 0.041) significantly ($p < .001$) determine work ability.

Several independent variables, namely social inclusion, cognitive functioning, work skills, and physical functioning, have significant effects on the work ability of both groups

Table 5. Multiple regression model.

	Work ability of the non-disabled respondents		Work ability of the disabled respondents	
	Beta	t-value	Beta	t-value
Gender (male = 1)	0.021	1.383	0.046***	4.137
Age (under 40 years of age = 1)	0.024	1.566	0.070***	5.870
Education (secondary education = 1)	0.092***	5.994	0.020	1.742
Inclusion				
Social inclusion	0.100***	3.906	0.154***	8.145
Social functioning	−0.007	−0.316	−0.024	−1.703
Mental well-being	0.127***	4.390	0.028	1.310
Skills				
Cognitive functioning	0.121***	6.102	0.133***	9.291
Work skills	0.200***	7.584	0.177***	9.638
Physical functioning	0.251***	14.143	0.324***	25.732
Human Resource Development (HRD = 1)	0.024	1.592	0.041***	3.677
Adjusted R^2		0.426		0.402
F-value		191.792***		330.286***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

of respondents. These are important determinants in improving work ability both for the non-disabled and disabled respondents.

Some other variables, namely gender, age and HRD, have significant effects on the work ability of the disabled respondents only. These variables, in particular HRD in an inclusive human resources management perspective, should be carefully considered in order to improve the work ability of disabled people.

4.2. Analysis 2, on the relationship between the work ability, inclusion, and human resource development of the disabled respondents

In Analysis 2, our study explores the relationship between the work ability, inclusion, human resource development, skills, physical functioning, and employability of the disabled respondents. We design the path model of Figure 2 based on theory development, hypotheses, and results from Analysis 1, and conduct SEM (Structural Equation Modelling) analysis using Amos 29.0. All numerical values in the path model are path coefficients (standardised partial regression coefficients), correlation coefficients, and the squared multiple correlation coefficient (in the upper right of the endogenous variable). The path coefficients and correlation coefficients are significant ($p < .001$, Figure 2). We examine various indices to assess the path model's goodness of fit. In this path model GFI is 0.911 (≧0.900), AGFI is 0.885 (≧0.800), NFI is 0.901(≧0.900), RMSEA is 0.069 (≦0.080), CFI is 0.904 (≧0.900), IFI is 0.904 (≧0.900) and HOELTER is 234 (≧200 if the model is at the significance level of 0.05). The conditions in the parentheses are required for the model's fitness. All indices indicate satisfactory model fit. In particular, in this path model the work ability of the disabled respondents leads to the employability as a result. If their work ability is improved, then their employability will increase, which suggests that achieving improved work ability is the mechanism to enable disabled people realise decent work in the workplace.

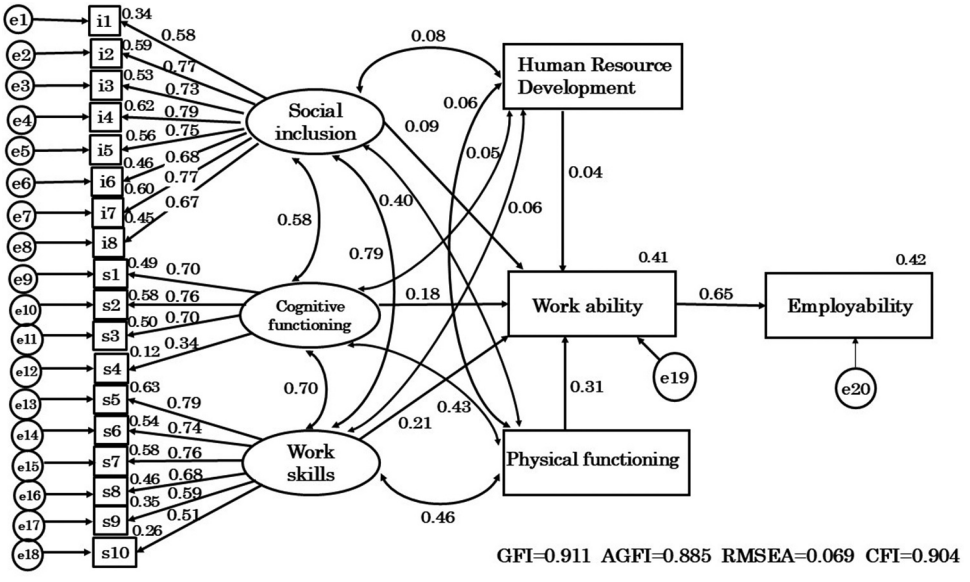

Figure 2. Path model: Relationship between the work ability, inclusion, and human resource development of the disabled respondents.

5. Discussion and contributions of our study

Let us discuss first whether our hypotheses are supported or not.

As the results of Analysis 1 (Table 4) show, work ability is significantly lower for the disabled respondents compared to the non-disabled ones. From the results of Analysis 1 (Table 5) of the multiple regression model, it is not education, but gender and age, which significantly determine the work ability of disabled people. Even when disabled people receive secondary education at least, they face difficulties getting access to decent employment opportunities, which would enable them to acquire their work ability. Therefore, education alone does not go far enough in determining the work ability of disabled people. Thus, **Hypothesis 1:** ***The educational background of disabled people determines their work ability*** is not supported. Rather, our findings indicate that gender and age significantly determine the work ability of disabled people. It means that the difficulties that disabled people face in acquiring their work ability are higher for females than for males, and higher for the respondents who are over 40 years of age than those under. These difficulties may be higher for objective reasons or for subjective ones in the perceptions of the employers and staff in charge of hiring. Our results support the findings of ILO (2015b) that disabled people, particularly disabled women, experience higher rates of unemployment, economic inactivity, and a lack of social protection in comparison to their non-disabled peers. Our findings suggest the need to carefully consider the gender and age diversity of disabled people in the labour market in order to improve their work ability.

Analysis 1 (Table 5) supports **Hypothesis 2:** ***The physical functioning of disabled people determines their work ability***. On the basis of a large dataset, our results reinforce the findings of Achterberg et al. (2009) and Zyznawska et al. (2013).

Analysis 1 (Table 5) also supports **Hypothesis 3:** ***The work ability of disabled people is improved by human resource development***. This finding has huge managerial implications.

From the results of Analysis 1 (Table 4), **Hypothesis 4:** ***Disabled people perceive lower inclusion compared to non-disabled people*** is supported. Our findings highlight that disabled people perceive lower inclusion compared to non-disabled people, and the need for proper disability inclusion by analysing the self-perceived inclusion of disabled people.

Analysis 1 (Table 5) also supports **Hypothesis 5:** ***The inclusion of disabled people leads to their improved work ability***. Our findings highlight the importance of inclusion perceived by disabled people themselves as it leads to improved work ability of disabled people.

From the results of Analysis 1 (Table 5), the mental well-being of disabled people does not significantly determine their work ability, although that of non-disabled people determines their work ability. Thus, **H6:** ***The mental well-being of disabled people leads to their improved work ability*** is not supported. We have to further carefully investigate this issue.

Regarding both cognitive functioning and work skills, Analysis 1 (Table 5) supports **H7:** ***The work ability of disabled people is improved by upgrading their skills***. Thus, our findings highlight the importance of the acquisition of both cognitive functioning and work skills by disabled people.

From the results of Analysis 2, path model (Figure 2), we find that the outcome of the improved work ability of disabled people is their improved employability. Therefore, **Hypothesis 8:** ***The improved work ability of disabled people leads to their improved employability*** is supported.

Underneath we underline the main contributions of our study, of which we believe there are at least four.

Using the work ability concept of Ilmarinen et al. (1992, 2005, 2007, 2019), and a huge dataset, the first contribution is to compare the determinants of the work ability of disabled with non-disabled people. We find in particular that the effects of human resource development on the work ability of disabled people are significantly more important than that of non-disabled people. This is very indicative of the need for an inclusive HRM. Our findings highlight the significant effects of HRD, incorporating vocational education and training, coaching, and mentoring on the work ability of people with disabilities, who are in a weak position in the labour market. These findings contribute to the further development of the HRD framework and extend the existing research by Aittomäki et al. (2003), Bugajska and Łastowiecka (2005), and Pak et al. (2021) which indicate that human resource developmental practices are positively related to work ability, and the research by Braathen et al. (2015) which demonstrates that occupational rehabilitation programs have positive effects on work ability.

Inclusion is also a significant determinant of the work ability of disabled people; thus, an inclusive HRM is crucial so that disabled people feel they are a significant part of an entity with others in society.

Both cognitive functioning and work skills are necessary for disabled people to improve their work ability, as is physical functioning. Thus, cognitive functioning and

work skills development programs, and sports participation and exercises programs are effective for the improvement of the work ability of disabled people, in an inclusive HRM.

The second contribution of our study is to focus on the inclusion perceived by disabled people themselves who are in a weak position in the labour market. Then, our research explores the relationship between the inclusion, work ability, and human resource development of disabled people. While Pérez-Conesa et al. (2020) define the effectiveness of disability inclusion as the percentage of people with disabilities working in an organisation, our study focuses on the inclusion perceived by disabled people themselves, so as to further develop the HRD framework and contribute to an inclusive HRM. Our findings highlight that disabled people self-perceive lower inclusion compared to non-disabled people, and the need for proper disability inclusion as a dimension of an inclusive HRM. As our research in particular focuses on the determinants of the work ability of disabled people, our results show that their self-perceived inclusion will improve their work ability and that their self-perceived inclusion is related to HRD. Although our future research should consider in more detail HRD's effects and its mechanisms on the inclusion perceived by disabled people themselves, our findings further develop the HRD framework and contribute to an inclusive HRM.

The third contribution of our study is underlining the importance of an interdisciplinary approach to disability. The interdisciplinary approach of this study helps us to understand the body functions and structures of disabled people, support their activities, facilitate their participation from welfare to employment procurement, and explores HRD to improve their work ability in the workplace. Thus, our interdisciplinary study helps educators, policy makers and HRD professionals in practice to improve the work ability of disabled people. In particular, exploring HRD to improve the work ability of disabled people from an interdisciplinary perspective contributes to an inclusive HRM. Additionally, we analyse a huge dataset on disabled people who responded to the Abilitator (Kykyviisari) questionnaire developed by Finnish Institute of Occupational Health. Disabled people, depending on their degree or kind of disability, are sometimes considered as having difficulties in responding to questionnaires from the perspective of recognition. However, the Finnish Institute of Occupational Health created an interdisciplinary team of medical doctors, physical therapists, psychologists, and experts in ergonomics, and developed three versions (the general version, the easy version, and the easiest-to-understand version) of the Abilitator questionnaire so that disabled people could understand the meaning of the questions according to their degree or kind of disability. For example, some people with intellectual disabilities could not properly understand and respond to the general version of questionnaire, but they could understand the concepts of work ability and inclusion in the easy version or the easiest version of questionnaire with their easy-to-understand expressions and simple pictures, which allowed them to respond to the questionnaire with the help of psychological counsellors. This interdisciplinary approach to disability provides reliable and high-quality data that we analyse in this study, leading to fruitful results. Thus, our study contributes to further developing the HRD framework by examining the work ability and inclusion of disabled people from an interdisciplinary perspective.

The fourth contribution of our study is to explore the relationship between the work ability, inclusion, human resource development, and employability of disabled people. We examine both the determinants and outcomes of their work ability. In particular, we conclude from the path model that the improved work ability of disabled people leads to their improved employability. The findings of our study that improving the work ability of the disabled is the mechanism for their improved employability, pave the way for incorporating disability inclusion in the workplace, and in related management practices. Our results suggest that achieving improved work ability through HRD enables disabled people realise decent work, and it contributes to further developing the HRD framework.

6. Implications for future research

Our study examines the determinants and outcomes of the work ability of disabled people. We especially focus on human resource development, exploring its effects on the work ability of disabled people, and suggest our findings in the design of proper inclusive human resource management programs, which acknowledge the value of vulnerable people, such as disabled people in the labour market. We also identify the mechanism whereby HRD improves the work ability of disabled people, which in turn leads to their improved employability, and suggest our conclusions have HRD implications for the achievement of decent work for disabled people. Additionally, we develop the HRD framework by focusing on the inclusion perceived by disabled people themselves, suggesting the use of inclusion-enhancing HRD in respect of disabled people, as their self-perceived inclusion improves their work ability, and thereby contribute to a more inclusive HRM. Furthermore, we further expand and develop the HRD framework by examining the work ability and inclusion of disabled people from an interdisciplinary perspective based on the ICF and suggest that this is very useful in practice for educators, policy makers, and HRD professionals.

However, we should further investigate the dynamic interaction between the work ability, inclusion, and human resource development of disabled people. Our study does not consider the actual nature of the human resource development which is implemented, but only discusses whether disabled people experience human resource development including vocational education and training, mentoring, and coaching. Future research should analyse the different kinds of human resource development as variables and discuss their effects on work ability in detail.

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Disclosure statement

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Data availability statement

The raw data that support the findings of this study are held by the Finnish Institute of Occupational Health (FIOH), but restrictions apply to the availability of these data.

Ethics approval

Research on the Abilitator data was approved by the ethics board of the Finnish Institute of Occupational Health in June 2017 (6/2017 - 6 §).

Informed consent

Informed consent was obtained from all individual participants included in the study.

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