

**Work ability as a risk marker of employee health and organisational
effectiveness in four UK manufacturing organisations**

Karen Coomer, BSc, MSc

Thesis submitted to the University of Nottingham
for the degree of Doctor of Philosophy

June 2017

Table of Contents

Table of Contents	i
Abstract.....	1
Preface.....	3
Publications and presentations arising from the thesis	6
Acknowledgements	7
Chapter One: Introduction	8
1.1 Definitions of key constructs and theories	8
1.2 Background to the problem.....	8
1.3 Changes in the workplace.....	10
1.4 Work ability	12
1.4.1 The Finnish concept of work ability	12
1.4.2 Definition of work ability	15
1.4.3 Measurement of work ability.....	17
1.5 Personality	19
1.5.1 The definition of personality	19
1.5.2 The Big Five	19
1.5.3 Core self-evaluation.....	21
1.5.4 Gaps in knowledge	25
Chapter Two: Occupational health professionals’ knowledge, understanding, and use of work ability (Study 1)	27
2.1 Abstract.....	27
2.2 Introduction	28
2.3 Aims of the current study	28
2.4 Method	30
2.4.1 Methodological approach	30
2.4.2 Procedure and participants.....	30
2.4.3 Measures	31
2.4.4 Analytical approach.....	32
2.4.5 Ethical considerations.....	33
2.5 Results	34
2.5.1 Data available for analysis.....	34
2.5.2 Response rates	34
2.5.3 Generalisability.....	36
2.5.4 Differences between the two study groups.....	37
2.5.5 Understanding of the term work ability.....	47
2.5.6 Using the WAI.....	48

2.6 Discussion	52
2.6.1 Summary of findings	52
2.6.2 Implications of the current study	53
2.6.3 Limitations of the current study.....	54
2.6.4 Summary.....	56
Chapter Three: The cross-sectional contribution of work ability and personality to worker health and operational effectiveness (Study 2)	57
3.1 Abstract	57
3.2 Introduction	58
3.3 Aims of the current study	61
3.4 Method	63
3.4.1 Methodological approach	63
3.4.2 Background to the study	64
3.4.3 Ethical considerations.....	65
3.4.4 Data collection procedures.	66
3.4.5 Participants.	67
3.4.6 Measures.....	68
3.4.7 Analytical approach.....	75
3.5 Results	77
3.5.1 Data available for analysis.....	77
3.5.2 Response rate.....	77
3.5.3 Sample size calculation	79
3.5.4 Online versus paper surveys	79
3.5.5 Generalisability.....	79
3.5.6 Descriptive statistics	80
3.5.7 Inferential analyses	83
3.6 Discussion	90
3.6.1 Summary of findings	90
3.6.2 Findings compared to previous studies	91
3.6.3 Implications of the current study	92
3.6.4 Limitations of the current study.....	955
3.6.5 Conclusion.....	977
Chapter Four: The longitudinal contribution of work ability and personality to worker health and operational effectiveness (Study 3)	98
4.1 Abstract	98
4.2 Introduction	98
4.3 Aims of the current study	99
4.4 Method	102

4.4.1 Methodological approach	102
4.4.2 Background of the study.....	102
4.4.3 Data collection procedures	103
4.4.4 Participants	104
4.4.5 Measures.....	104
4.5 Results	104
4.5.1 Data available for analysis.....	105
4.5.2 Response rate.....	105
4.5.3 Sample size calculation	106
4.5.4 Descriptive statistics	106
4.5.5 Inferential analyses	111
4.6 Discussion.....	122
4.6.1 Summary of findings	122
4.6.2 Findings compared to previous studies	123
4.6.3 Implications of the current study	126
4.6.4 Limitations of the current study.....	127
4.6.5 Conclusion.....	128
Chapter Five: Single item work ability score versus multi-item work ability index (Study 4).....	130
5.1 Abstract.....	130
5.2 Introduction	131
5.3 Aims of the current study	132
5.4 Method	134
5.4.1 Background of the study.....	134
5.4.2 Measures.....	134
5.4.3 Analytical approach.....	135
5.4.4 Power calculation	135
5.5 Results	136
5.5.1 Data available for analysis.....	136
5.6 Discussion.....	147
5.6.1 Summary of findings	147
5.6.2 Findings compared to previous studies	147
5.6.3 Implications of the current study	150
5.6.4 Limitations of the current study.....	151
5.6.5 Conclusion.....	152

Chapter Six: Discussion and conclusion	153
6.1 Introduction	153
6.1.1 Rationale of work ability	153
6.1.2 Rationale for inclusion of the Big Five and Core Self Evaluation	154
6.2 Summary of results from study 1	158
6.3 Discussion of results from study 1	159
6.4 Summary of results from studies 2 and 3.....	161
6.5 Discussion of results from studies 2 and 3	162
6.5.1 The relationship between work ability, core self-evaluation, the Big Five, and psychological distress.....	163
6.5.2 The relationship between work ability, core self-evaluation, the Big Five, and job stress.....	167
6.5.3 The relationship between work ability, core self-evaluation, the Big Five, and job satisfaction.....	175
6.5.4 The relationship between work ability, core self-evaluation, the Big Five, and work engagement.....	179
6.5.5 The relationship between work ability, core self-evaluation, the Big Five, and sickness absence	182
6.6 Validity and reliability of the work ability index, the core self-evaluation tool, and the Big Five inventory	189
6.7 Summary of results from study 4	192
6.8 Discussion of results from study 4	193
6.9 Limitations of the current investigation.....	194
6.9.1 Self-report measures	195
6.9.2 Response rate and sample size.....	196
6.9.3 Generalisability.....	197
6.9.4 The study design.....	197
6.10 Practical and theoretical implications	198
6.11 Ethics and legal considerations	199
6.12 Workplace interventions	205
6.12.1 Public health approach.....	205
6.12.2 The ageing workforce and work ability.....	206
6.13 Further research.....	214
6.13.1 Future developments for occupational health.....	219
6.14 Conclusion.....	220
References.....	222
Appendices.....	271
Appendix A: Understanding and use of the Work Ability Index	271
Appendix B: Cover letter inviting employees to participate in study 2.	274

Appendix C: Measures of work ability, CSE, psychological distress, job satisfaction, work engagement, and sickness absence.....	275
Appendix D: Results of hypothesis testing from studies 2 and 3.....	282
Appendix E: Overview of research on work ability and study variables.....	285
Table E1: Overview of Research on Work Ability and Mental Health.....	285
Table E2: Overview of Research on Work Ability and Job Stress.....	286
Table E3: Overview of Research on Work Ability and Job Satisfaction.....	287
Table E4: Overview of Research on Work Ability and Work Engagement.....	287
Table E5: Overview of Research on Work Ability and Sickness Absence.....	288

List of figures

Figure 1.1: <i>Work Ability House</i>	13
---	----

List of Tables

Table 2.1: <i>Study 1 Respondent Demographic and Occupational Characteristics</i>	38
Table 2.2: <i>Have you heard of the WAI?</i>	39
Table 2.3: <i>How did you hear about the WAI?</i>	40
Table 2.4: <i>Have you ever used the WAI?</i>	41
Table 2.5: <i>How have you used the WAI?</i>	42
Table 2.6: <i>Did you find the WAI straightforward to use?</i>	42
Table 2.7: <i>Which version did you use?</i>	43
Table 2.8: <i>How have the results of the questionnaire been used?</i>	45
Table 2.9: <i>Who do you think should be able to use the WAI?</i>	47
Table 2.10: <i>Understanding of the Term 'Work Ability'</i>	48
Table 2.11: <i>Why did you find the WAI straightforward to use?</i>	50
Table 2.12: <i>If the WAI was not straightforward to use was it because?</i>	51
Table 2.13: <i>Why have you not used the WAI?</i>	52
Table 3.1: <i>Study 2 Comparison of early and late responders</i>	78
Table 3.2: <i>Cross-Sectional Descriptive Statistics, Scale Reliabilities, and Correlations Between Variables (n = 311)</i>	82
Table 3.3: <i>Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Psychological Distress</i>	84
Table 3.4: <i>Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Job Stress</i>	85
Table 3.5: <i>Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Job Satisfaction</i>	86

Table 3.6: <i>Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Work Engagement</i>	88
Table 3.7: <i>Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Sickness Absence</i>	89
Table 3.8: <i>Study 2 Overview of CSE and the Big Five Contribution</i>	90
Table 4.1: <i>Study 3 Comparison of T2 Responders and Non-responders</i>	106
Table 4.2: <i>Study 3 Time 1 Longitudinal Descriptive Statistics, Scale Reliabilities, and Correlations Between Variables</i>	109
Table 4.3: <i>Study 3 Time 2 Longitudinal Descriptive Statistics, Scale Reliabilities, and Correlations Between Variables</i>	110
Table 4.4: <i>Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Psychological Distress</i>	113
Table 4.5: <i>Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Job Stress</i>	115
Table 4.6: <i>Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Job Satisfaction</i>	117
Table 4.7: <i>Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Work Engagement</i>	119
Table 4.8: <i>Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Predicting Sickness Absence</i>	121
Table 4.9: <i>Study 3 Overview of CSE and the Big Five Contribution</i>	122
Table 5.1: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Psychological Distress at 19-month Follow-Up</i>	137
Table 5.2: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Psychological Distress at 19-month Follow-Up</i>	138
Table 5.3: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Job Stress at 19-month Follow-Up</i>	139
Table 5.4: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Job Stress at 19-month Follow-Up</i>	140
Table 5.5: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Sickness Absence at 19-month Follow-Up</i>	141
Table 5.6: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Sickness Absence at 19-month Follow-Up</i>	142

Table 5.7: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Work Engagement at 19-month Follow-Up</i>	143
Table 5.8: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Work Engagement at 19-month Follow-Up</i>	144
Table 5.9: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Job Satisfaction at 19-month Follow-Up</i>	145
Table 5.10: <i>Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Job Satisfaction at 19-month Follow-Up</i>	146
Table 5.11: <i>Overview of WAS and WAI Variance Differences</i>	147

Abstract

Work ability (WA) concerns a worker's capacity to manage their job demands in relation to their physical and psychological resources. Over the last decade, the WA construct and its associated measurement instrument, the Work Ability Index (WAI), have become established within occupational health practice in several countries, particularly within Scandinavia. One consequence of this is that occupational health researchers have begun to utilise WA in the prediction of worker health and operational effectiveness outcomes.

Anecdotal evidence suggests that occupational health professionals in the United Kingdom (UK) have begun to use, or express interest in using, WA because of its increasingly widespread use in research, the gradual accumulation of information from Scandinavia on its potential for application within occupational health practice, and challenges presented to occupational health by an ageing workforce. In response, the first study in this thesis concerns a survey of UK ($n = 436$) and Finnish ($n = 97$) occupational health practitioners centred on their awareness, understanding, and application of WA in occupational health practice. Comparisons are drawn between the two countries to highlight possible areas for development in the use of WA in UK-based occupational health practice.

There is a paucity of WA research derived from the UK and manufacturing contexts. As such, the extent to which the WA construct might have utility in these contexts remains unclear. In response, the second study in this thesis concerns a cross-sectional survey of employees drawn from four UK manufacturing organisations ($n = 311$). The study centres on relations between work ability on the one hand and individual health (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence) on the other. The predictive influence of personality constructs – core self-evaluation and the Big Five – is also examined. To address some of the limitations of cross-

sectional research, the third study offers a longitudinal examination of these relationships involving a 19-month time lag ($n = 74$).

Within the last five years, a number of researchers have sought to examine the relative utility of different versions of the WAI. As with most WA research, this has derived primarily from Scandinavia. The relative utility of different versions of the instrument in the UK and manufacturing contexts remains unclear. In response, the final study in the thesis compares a multi-item and single item version of the WAI in the UK manufacturing sector in terms of the prediction of individual health and operational effectiveness outcomes.

This thesis concludes that there is a lack of understanding and use of the WA construct in UK occupational health practice. Work ability, and to a lesser extent the personality constructs, were found to be related to workers' health, wellbeing, and organisational effectiveness. Finally, it was found that the two versions of the WAI instrument differed in terms of their predictive validity. The results of this thesis are discussed in light of their application to the development of theory, research, and occupational health practice.

Key words: work ability, core self-evaluation, Big Five, psychological distress, job satisfaction, job stress, work engagement, sickness absence.

Preface

Background to the study

As a practicing occupational health nurse specialist, for many years I have been interested in the personality and human resource differences between employees that present with similar health issues. From a practice perspective, this can lead to differing barriers to returning to work following absence or varied coping strategies for dealing with adverse events; a biopsychosocial approach is therefore necessary when case managing such diversity. From an organisational perspective, I was also aware of companies – my clients – that had implemented various wellness initiatives. While there was initially enthusiasm among the workforce to participate in initiatives such as well person clinics, healthy eating, and lunch time exercise sessions, this enthusiasm did not appear sustainable in the longer term. I was also told they did not positively influence outcome measures such as absence and work engagement. A more comprehensive way of doing ‘wellness’ that took into account the employment journey, stages of life, and interventional programmes to sustain good health, productivity, and prevent ill health, was therefore discussed among these companies.

This led me to look at Scandinavian occupational health practice as I had been aware for some years that it promoted the concept of work ability. In 2010, I attended a seven-day course at the Nordic Institute for Advanced Training in Occupational Health in Finland; this focused on the work ability construct within the life course of employment.

A biopsychosocial work ability model was presented and a research gap identified concerning psychological correlates of work ability. It was at this point that I decided to embark on a PhD to study these variables and relationships in more detail. In 2013, I went back to Finland and met with international researchers and scientific practitioners who used the work ability concept; this visit confirmed the influence this construct has on occupational health practices in Scandinavia, in contrast to an apparent lack of interest in the UK.

Aims and focus of the thesis

In view of the paucity of empirical knowledge on work ability and individual differences in the UK, the main aims of this thesis are to:

1. Establish the understanding and use of the work ability construct among occupational health practitioners in the United Kingdom (Study 1).
2. Examine cross-sectional and longitudinal relations between work ability and personality on the one hand, and indices of individual health (psychological distress, job stress, job satisfaction) and organisational effectiveness (work engagement and sickness absence) on the other (Studies 2 and 3).
3. Compare the validity of two leading versions of the work ability index (Study 4).

Structure of the thesis

Chapter 1 presents a broad overview of the historical development and contribution to research and practice of work ability and the personality constructs of core self-evaluation, and the Big Five traits. A general introduction to the theoretical perspective and terminologies adopted in the thesis is outlined in the context of the changing world of work and public health priorities which, in turn, have influenced occupational health practice.

Chapter 2 presents the first study which explores occupational health professionals' knowledge, understanding, and use of work ability in the UK and Finland. It also seeks to identify factors that influence the use of WA in Finnish occupational health practice, with a view to examining the scope for these drivers to similarly influence practice in the UK. This study was influenced by the very limited number of studies that have been conducted in the UK on work ability, compared to extensive interest and research that has been demonstrated in other countries. It therefore lays the groundwork for the discussion of whether it is a concept that can be used in the UK.

Chapter 3 presents the first of two studies that aim to contribute to the work ability and personality. The focus is on the cross-sectional contribution of work ability and personality to the explanation of variance in psychological distress, job stress, job satisfaction, and the broader organisational constructs of work engagement and sickness absence.

Chapter 4 presents offers a response to the limitations of the cross-sectional design applied in Chapter 3, through the application of a longitudinal design involving a 19-month time lag to examine the same research questions.

Chapter 5 concludes the investigation by prospectively comparing the predictive validity of two leading versions of the Work Ability Index: The short and single item version. Results are discussed with regard to the broader implications for the validity and application of these instruments in contemporary occupational health practice.

Conclusions and future directions

Chapter 6 summarises the findings from the previous chapters, drawing from the available evidence base and the differing macro factors which have contributed to the use of work ability in countries such as Finland. It draws conclusions about the usefulness of core self-evaluation in enhancing long term sustainable employee wellbeing, and considers the practical implications of this research and concept in contemporary occupational health practice. Finally, it considers the limitations of the research carried out in this investigation and concludes with recommendations for future research.

Publications and presentations arising from the thesis

Coomer, K., & Houdmont, J. (2013). Occupational health professionals' knowledge, understanding, and use of work ability. *Occupational Medicine*, 63(6), 405-409.

Coomer, K., & Houdmont, J. (2016). Work Ability as a Risk Marker of Worker Health and Organisational Effectiveness: A Cross-sectional Study. Paper presented at the 12th Conference of the European Academy of Occupational Health Psychology, Athens, Greece.

Coomer, K., & Houdmont, J. (2016). Work Ability as Risk Marker of Worker Health and Organisational Effectiveness: Longitudinal Comparison of the Single item Work Ability Score Versus multi-item Work Ability Index. Poster presentation at the 12th Conference of the European Academy of Occupational Health Psychology, Athens, Greece.

Author's contribution

The investigation described in this thesis was conducted solely in fulfilment of the award of PhD. The investigation did not form part of a planned organisational initiative; the author initiated it in her capacity as a doctoral student, but used her experience as an Occupational Health Nurse Practitioner to initially observe the gaps in knowledge and consequent practice. No external funding was received and no academic input, beyond that provided by her supervisor, was received.

Acknowledgements

There are many people who have supported me in the journey of this research.

My thanks go to the management, human resource personnel, and participants in the four organisations that participated in the study.

I owe my deepest thanks and gratitude to my supervisor, Assistant Professor Jonathon Houdmont, who has guided me through the research process in a patient, constructive, and encouraging way. He understands the challenges that undertaking a part-time PhD can bring and has set aside time for face-to-face meetings, telephone, and e-mail conversations accordingly. In particular, he is a champion of practitioners doing research in the real world, and for that I am truly appreciative on behalf of my profession.

I have many occupational health colleagues and friends to thank who have listened, encouraged, and helped me along the PhD journey. Occupational health is a community and it is this collective faith and the belief that I will achieve the end goal which has kept me going in the more difficult times.

On a personal note, my husband Lindsay has been a constant source of encouragement and practical support in keeping the home fires burning when I have been in PhD land – I will be forever grateful. My children Keir and Moira have grown up alongside their mum doing a PhD, but they have been a source of inspiration and delight in this long and sometimes lonely journey – thank you for keeping me grounded to the realities of life.

Last but not least, big hugs to my two dogs – Millie and Fergus – who have kept me company during long hours at the computer and have understood the correlation between exercise and productivity by their insistence on dragging me away for regular walks.

Chapter One: Introduction

1.1 Definitions of key constructs and theories

This thesis considers the understanding and use of the concept of work ability (WA) in occupational health practice. Further, it concerns the contribution of WA and personality to explaining workers' health and organisational effectiveness. This chapter provides a general introduction to the work ability and personality concepts from a historical and current theoretical and empirical perspective.

1.2 Background to the problem

In recent years, there has been development and repositioning of occupational health which has moved away from predominately focusing on occupational safety and disease to the more strategic themes of using the workplace to improve health and wellbeing. This includes preventing work-related illness, delivering integrated care – particularly to those with long term conditions – and managing sickness absence (Harrison, 2014). This has largely been influenced by the development of government policy which favours prevention-centred approaches to health and wellbeing as a life course approach (Public Health England [PHE], 2013), because of the concern about societal chronic ill health conditions. Adults with chronic ill health conditions bring their health to work and develop ill health issues during the span of employment. This includes entry into the workforce as an older adolescent or young adult to the progression of an older adult now expected to work longer than previous generations (Department of Work and Pensions [DWP], 2015a). This has had the effect of employers managing individual lifestyle ill health issues in the workforce which has consequently led to a focus on the effect this has on wider workplace health, cost, and productivity (Black, 2008; Boorman, 2009; Confederation of British Industry [CBI], 2014). Consequently, the focus of public health has changed and is demonstrated by Public Health England (2014) which states:

What we need is a fundamentally new approach to creating and sustaining health, mental and physical, at every stage of life and across all our communities. It is an approach that acknowledges that our health is shaped by where and how we live: by our jobs, families, homes; but that also recognises the power of individuals to change their lifestyles, especially if they get the right support at the right time' (p.4).

This relatively new focus has reinforced the two major philosophies about what health is and how it is influenced. The first is largely the product of individual behaviour and individual responsibility, the second is influenced by a number of forces, a significant number of which are outside the individual's control. Consequently, the workplace is seen as an influence with the focus on the organisation and design of work in both its physical and psychosocial dimensions (Boorman, 2009; Shain & Kramer, 2004). It has been acknowledged that health, as experienced and observed in the workplace, is influenced by two major forces; what employees bring with them to the workplace in terms of personal resources, health practices, beliefs, attitudes, values, and hereditary endowment, and what the workplace does to employees once they are there in terms of the organisation of work in a biopsychosocial context (Bugajska & Lastowiecka, 2005; Royal College of Nursing [RCN], 2013; Shain & Kramer, 2004). Yet despite the call for a new approach, occupational health practice is still dominated by a medical model. This is described by Engel (1977) as a process that moves from the recognition and palliation of symptoms to the characterisation of a specific disease in which the etiology and pathogenesis are known and treatment is rational and specific.

In contrast, a biopsychosocial model takes into account all relevant determinants of health and disease and that supports the integration of biological, psychological, and social factors in the assessment, prevention, and treatment of diseases (Havelka, Lučanin, & Lučanin, 2009). It does not diminish the significance of biological factors, but extends a rather narrow biomedical approach to contribute a better understanding of the impact of

psychosocial factors on health. However, this approach requires new skills, knowledge, and a different practitioner consultation approach to the traditional ‘expert’ approach, and is not supported by all occupational health practitioners (Raynal, 2015). In addition, Leka, van Wassenhove, and Jain (2015) raise the point that, across Europe, expertise in assessing psychosocial risk is still scarce among occupational health services personnel and consequently appropriate support to businesses might be lacking which undoubtedly also complicates understanding in this area since the approach employed to deal with psychosocial risks is very much focused on ‘mending harm’ and not sufficiently on prevention through managing risks.

1.3 Changes in the workplace

The transformation of the industrial age into the information and services age, at a global level, has created dramatic changes in the manner in which organisations are now structured and managed (Judge & Kammeyer-Mueller, 2011). The traditional notion of the “job” with a fixed set of tasks has eroded significantly, to be replaced with a collection of constantly varying work demands that call for general competencies (Bartram, 2005). This transformation of the workplace means that understanding the functioning of organisations in the future will depend more heavily on understanding the people who make up these organisations than on understanding a static hierarchy of formal roles (Judge & Kammeyer-Mueller, 2011). In such organisations, employees cannot be purely reactive in the hope of ascending through a career path based on time served and seniority; they need to create new possibilities for themselves and the organisation as a whole (De Vos & Soens, 2008). Outsourced contractual ways of working has also changed the focus of career management with ‘boundaryless careers’ focusing on professional or occupational identity rather than the identity of the organisation for which they work (Gold & Fraser, 2002). Frese and Fay (2001) predicted that global competition will reign not only at company level, but also increasingly

at an individual level. Employees and self-employed individuals, particularly in the highly paid western world, continuously have to take the initiative to develop their knowledge and skills to remain competitive on the world market. A faster rate of innovation has led to a different way of decision making to enable the implementation of creative ideas at a quicker pace. This implies that employees have to make decisions on their own, and they have to follow through on these decisions. Employees are therefore encouraged to act independently, as shapers of their own work environments and careers, and this in turn has led to demand for different ways of working. This has included moving away from a traditional office-based environment to working from home on a remote, flexible basis (British Telecom, 2007; Transport for London, 2011) and the rise of self-managed teams which are peer controlled rather than management led (Stewart, Coutright, & Barrick, 2012).

Researchers in the area of positive psychology have described an equally dramatic shift away from research that examines the negative aspects of personality, towards research that investigates human capacity for growth, development, creativity, resilience, and happiness (Sheldon & King, 2001). A failure to account for these positive sides of life means that there will only be a partial understanding of the functioning and capabilities of the human person. This positive perspective means that in understanding the functioning of individuals, there is not just the need to know about the characteristics that predispose people to worry, anxiety, and depression, but also understand those characteristics that lead to successful management of one's environment and why people flourish (Roberts, 2006). For organisational research, this means devoting at least as much time to topics such as motivation, satisfaction, and engagement as is spent on topics like stress, conflict, withdrawal, and organisational turnover (Luthans, 2002).

This thesis emerges out of the aforementioned transitions in occupational health practice, policy, and research. Its approach is to empirically examine a blended philosophy of

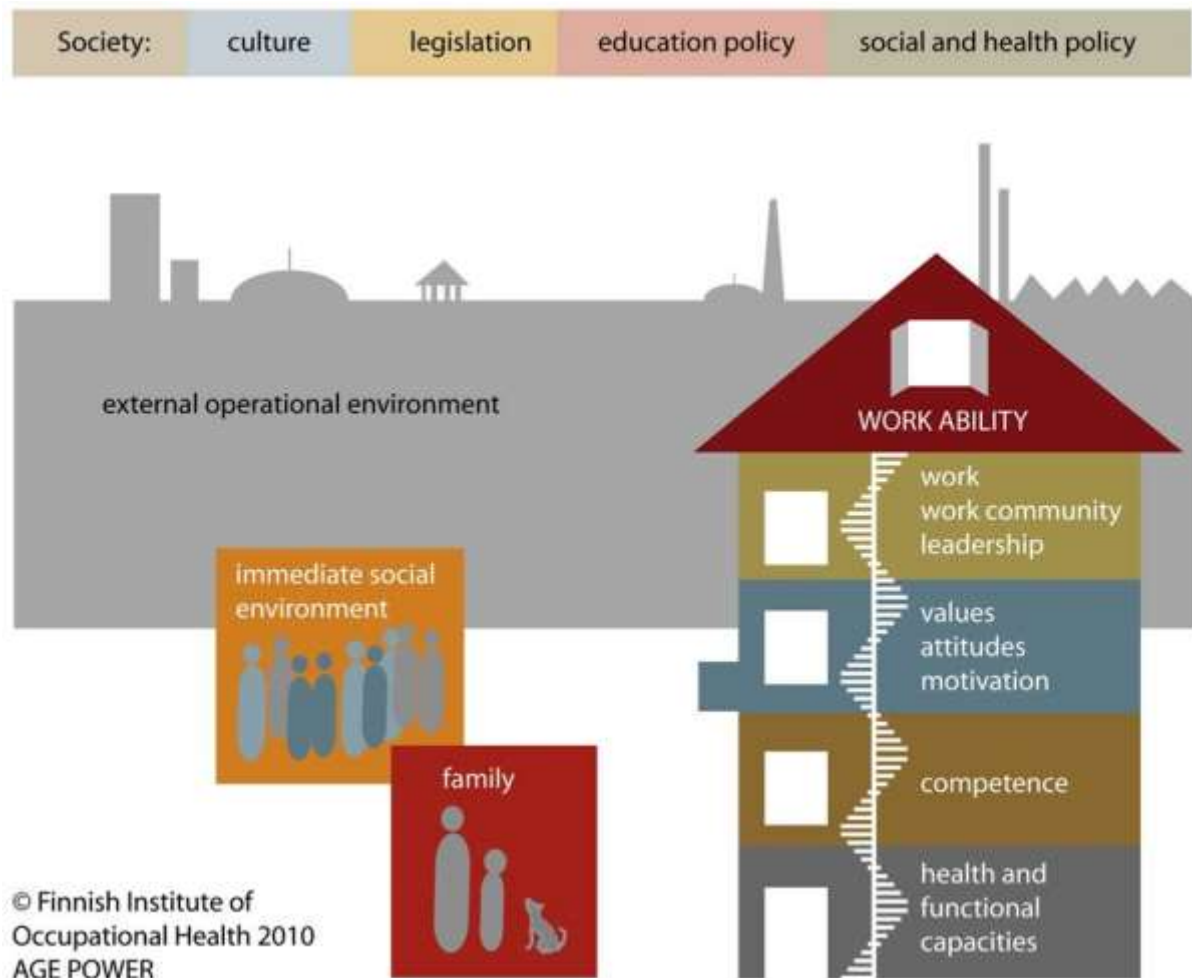
how health is perceived in the workplace, taking into account the organisational and individual indices that can encourage or hinder progress.

1.4 Work ability

1.4.1 The Finnish concept of work ability

The concept of work ability started in Finland as a response to a question posed by the Local Government Pensions Institution on whether stepwise increasing retirement ages remained relevant in the 1980s and, if not, what might be a better concept for retirement. Work ability (WA) can be defined as a worker's capacity to manage their job demands in relation to their health and mental resources (Coomer & Houdmont, 2013). It takes into account all the factors that may influence that capacity and make the job more or less manageable (Ilmarinen, 2001). Given that work demands are likely to change over the course of a career, the challenge over time is to balance demands and capacity in order to optimise the ability to work (Coomer & Houdmont, 2013). More recently, WA has been redefined into a blended model of biopsychosocial health that recognises not only the external influences of macro-economic and political structures, but also the dynamics between social interaction with family and factors at work such as; health and functional capacity, competency in the workplace, the work community and leadership, and values, attitudes, and motivation. These dimensions can be graphically represented as the Work Ability House (see Figure 1.1) which attempts to encapsulate the holistic nature of the concept. This model was developed through research which confirmed that WA has a complex structure including the human resources and characteristic of work as well as factors outside working life (Ilmarinen, Tuomi & Seitsamo, 2005). The results concluded that to ensure good WA, there must be a good balance between the bottom three levels and the top (Work) (Ilmarinen et al, 2005).

Figure 1.1

Work Ability House

Using the stress–strain concept, a multidisciplinary study group in the 1980s developed and validated a measure called the Work Ability Index (WAI) which took into account the demands of work, the worker’s health status, and resources (Ilmarinen et al., 1991). It consists of seven subscales regarding work ability compared with the lifetime best in relation to the demands of the job, the number of diseases, the work impairment, and the absence from work because of disease, and finally the individual’s own prognosis of work ability and mental resources. Research was conducted among municipal employees ($n = 6257$) over 45 years of age and repeated in 1985, 1992, 1997, and 2009 (Tuomi et al., 1997; von Bonsdorff et al., 2011). One of the main findings was that the mean work ability index

declined significantly among 30% of the participants, remained unchanged among 60%, and improved among 10% over an 11-year period for both genders, as well as for physically, mentally, or mixed (physical and mental) demanding jobs. A logistic regression model indicated that factors related to management, ergonomics, and lifestyle explained both the decline and improvement in work ability during aging (Ilmarinen & Tuomi, 2004; Ilmarinen, Tuomi, & Klockars, 1997). Ilmarinen (2011) describes the 30-year development of WA and the WAI in Finland in three key phases.

1. The evolution stage (1980–89) involved the development of the WAI as a self-reported measure of seven dimensions of WA and functional capacity. During this period, longitudinal WA research in Finland demonstrated WA decrements as workers age.
2. The second stage, of conceptualisation and implementation (1990–99), involved the training of Finnish OH physicians and nurses in the use of the WAI and the development of Finnish programmes promoting the use of WA in the workforce.
3. The third stage (2000–09) involved translation of the WAI into 24 languages (Lehtinen & Rantanen, 2012), presentations at numerous international conferences (Hasselhorn, Müller, Freude, Tempel, & Kaluza, 2005; Nachiappan & Harrison, 2005; Nübling, Hasselhorn, Seitsamo, & Ilmarinen, 2004), and the development of further age management research activities across Europe (European Commission, 2014).

Ilmarinen (2009) also emphasises good interaction and cooperation between supervisors and employees as a shared responsibility. In addition, management and human resource policy set the framework for the promotion of WA with central roles played by the occupational health care and occupational safety policies of the organisation which prevent the risks that threaten WA. Moreover, on the basis of the research carried out in the 1980s and 1990s, the tasks fixed by law for occupational health care in Finland include the

maintenance of employees' WA. The promotion of WA is therefore enshrined in the Finnish Occupational Health Care Act of 2002 and the Occupational Safety and Health Act of 2003, which state that 'maintaining work ability during aging is our common goal' and has led to comprehensive programmes using the WAI.

With reference to the Work Ability House, Ilmarinen (2013) acknowledges that the third floor (values, attitude, motivation) is not often the direct target for intervention (Figure 1.1). However, the influence of a worker's values and attitudes can influence engagement and commitment to work, which ultimately can lead to a longer working life and active ageing (Ilmarinen, 2013). The focus of this thesis is therefore on floor 3 of the Work Ability House (values, attitudes, motivation) and has led to examining individual and organisational indices and the influence of personality. The concept and role of personality within these relationships is considered in Study 2 and 3.

1.4.2 Definition of work ability

It is generally agreed that work ability is difficult to define (Fadyl, McPherson, Schlüter, & Turner-Stokes, 2010; Stigmar, Ekdahl, & Grahn, 2012; Tengland, 2011; Sturesson, Edlund, Fjellman-Wiklund, Falkdal, & Bernspang, 2013) and that its definition is largely dependent on the purpose to which it is applied. For those in the field of occupational and vocational rehabilitation, the purpose of defining and measuring work ability can potentially assess a person's capability to perform a job safely and prevent exclusion from work because of a disability (Fadyl et al., 2010). At a macro level, countries such as Sweden place work ability as central to the Swedish sickness insurance scheme where the principle entitlement to sickness insurance occurs if the disease reduces an individual's work ability by twenty five percent or more (Sturesson et al., 2013). However, as there is no clear definition of work ability by the Swedish Social Insurance Agency, it is unclear as to how work ability should be measured, which can lead to discrepancies (Sturesson et al., 2013). This is

demonstrated by a study which identified a difference in the perception of work ability between health professionals and social insurance officers with the former sharing a holistic view on work ability and the latter representing a reductionist stance, where work ability is reduced to medical status (Ståhl, Svensson, Petersson, & Ekberg, 2009). The authors concluded that assessments of work ability therefore tended to become a negotiation between insurance officers and physicians. As a concept, Tengland (2011) describes work ability as fulfilling five different functions in relation to working life and rehabilitation.

1) Regulating professional activities, for example by stating competencies and specification of what is expected by an employee in relation to different type of work and vocational training.

2) A tool to evaluate reasonable work adjustments which might reduce work-related illness, disease and injury.

3) A tool to use in the process of rehabilitation when the person has lost or partially lost their work ability.

4) The continued definition of work ability to help construct instruments with a high degree of validity that can be used to measure work ability and evaluate existing instruments.

5) The legal definition in relation to sickness insurance where the concept of work ability is used as a regulatory tool for the eligibility of economic compensation e.g. Sweden.

In light of these different functions, the applicability of a tool which potentially assists reasonable adjustments and identifies at risk employee populations for rehabilitation interventions would be beneficial in UK occupational health practice. In the UK context, work ability has been defined as ‘a person’s capacity to do the work tasks they are required to do’ (Harrison, 2016, p. 10). This definition could be interpreted as occupational health medical assessments, commonly known as health surveillance, in relation to exposure to specific hazards to assess the safety of an individual to work in specific sectors such as

manufacturing and construction. In this context, the ability of an individual to work with certain substances is measured objectively by medical tests such as spirometry and audiometry. Musculoskeletal capacity to work with vibrating tools is tested by the use of grip tests and the lower and upper body strength of individuals working in physical jobs, such as the fire service, assessed using timed capacity assessments, e.g. required to carry equipment and/or go up ladders in a specified time. While these specific measures could be described as assessing the individual's capacity to work, as defined by Harrison (2016), the focus is on occupational safety and disease rather than the improvement of health and wellbeing in the workplace, previously discussed in 1.2. Harrison (2016) further states that 'the maintenance of work ability and return to good work should be a key clinical outcome for all care pathways formulated for people of working age' (p. 10) with a recommendation of a paradigm shift in UK occupational health which encompasses the protection, promotion, and optimisation of work ability (Harrison, 2016).

1.4.3 Measurement of work ability

Just as there is no standard work ability definition, there is also no standard work ability measure. Fadyl et al. (2010) identified eight different measures in a systematic review of work ability measures – that is the ability to function in the job. The measures varied from assessing functionality after injury (Functional Capacity Index), screening for potential job loss (Work Instability Scales), perceived impact of injury on ability to meet work demands (Work Limitations Questionnaire), the ability of the worker to meet physical work demands (Functional Capacity Evaluation), assessment of ability to perform a particular job (Work Capacity Evaluation), perceived effect of back pain on role performance (Occupational Role Questionnaire), the identification of factors which are barriers to returning to work (Worker Role Interview), and the assessment of people as part of an occupational health assessment (Work Ability Index). The authors concluded that work ability measurement is used for a

number of different purposes which requires various different types of measures. This is also highlighted by the work of Turner-Stokes et al. (2014) with the development of a relatively new measure called The Work-ability Support Scale (WSS); part of a long-standing international collaboration between the UK and New Zealand (NZ). The instrument was designed to cover the key factors that contribute to work ability and provide a practical resource for clinicians to plan vocational rehabilitation/support in the course of onset acquired disability. The key factors included Part A: Physical function, thinking and communicating, and social/behavioural function within the workplace, and Part B: Personal, environmental and barriers to a return to work. The authors (Turner-Stokes et al., 2014) report that while there were acceptable levels of scoring accuracy and reliability for Part A of the instrument, there was difficulty rating Part B because of variable interpretation by the user. They therefore concluded that these factors should be used as a clinical checklist rather than an integral part of the measurement tool and further testing in a wider sample and in the context of clinical application is recommended. As Fadyl et al. (2010) state, 'careful consideration needs to be taken of the aspects of work ability that should be included to ensure that the measure is useful for its intended purpose'. Additionally, rigorous reliability and validity testing is vital to warrant use of the measure in research and practice (Fadyl et al., 2010).

As this thesis considers the concept of work ability in occupational health practice and in particular the measurement of work ability in relation to determinants such as biological, psychological, and social factors, the work ability index (WAI) (Tuomi et al., 1997) was selected for use in the empirical studies that follow. This measurement instrument is described in detail, and a rationale presented for its use in Chapter 3.

1.5 Personality

1.5.1 The definition of personality

The American Psychological Association defines personality as “individual differences in characteristic patterns of thinking, feeling and behaving”. The study of psychological systems and their interaction is to: 1) understand individual differences in particular personality characteristics, and 2) understand how the various parts of a person come together as a whole (American Psychological Association). Mayer (2007) agrees, positing that personality is a system of parts which includes components such as motives, emotions, mental models, and the self. In this thesis, the trait or dispositional theory has been examined which ‘operates from the assumption that one’s personality is a compendium of traits or characteristic ways of behaving, thinking, feeling and reaction’ (Reber & Reber, 2001, p. 525). Two trait constructs – the Big Five and Core Self Evaluation – have been selected for use in the studies that follow and are described in the next section of this chapter. A rationale for the inclusion of the Big Five and Core Self Evaluation is also presented in 6.1.2.

1.5.2 The Big Five

According to Furnham (2008, p. 121) the study of personality has been reborn in industrial, work, and organisational psychology with the emphasis on the personality and performance relationship. In terms of methodology, the use of the “Big Five” or Five-Factor Model of Personality has been the dominant measurement of personality and was derived from a ‘lexical approach’ that is clusters of personality descriptors that exist in natural language (Matthews, Deary, & Whiteman, 2009, p. 27). McCrae and John (1992) argue that for the layperson, personality is defined by language using words such as friendly, highly-strung, and punctual and, consequently, are basic ways in which individuals understand themselves. Psychologists must therefore use language which is understandable to users,

particularly because of the reliance on self-reports and peer ratings when gathering data (McCrae & John, 1992). Initial consensus on the five factors was achieved after decades of research on a general taxonomy of personality traits and is said to represent an integrative function in a common framework rather than a theoretical perspective (John, Naumann, & Soto, 2009, p. 116). According to John et al. (2009, p. 148) the progress and emergence of the Big Five structure has brought about a change from early individualistic pioneers to a more mature stage of scientific inquiry. This has consequently led to its use in clinical, education, forensic, and health psychology (McCrae & John, 1992) and in recent decades the relationship between personality factors and work behaviour (Furnham, 2008, p. 140). It can therefore be concluded that the Big Five model of personality is a hierarchical organisation of personality traits in terms of five basic dimensions (McCrae & John, 1992). The five general traits are: Extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience.

The first dimension is extraversion and is characterised by adjectives such as active, assertive, energetic, enthusiastic, outgoing, and talkative (McCrae & John, 1992). Extroverts are said to be more prone to positive behaviour and in developing interpersonal relationships with others (Therasa & Vijayabanu, 2015).

Agreeableness is a trait characterised by adjectives such as appreciative, forgiving, generous, kind, sympathetic, and trusting (McCrae & John, 1992). It is said to involve the more humane aspects of humanity with characteristics such as altruism, nurturance, caring, and emotional support at one end of the dimension and hostility, indifference to others, self-centeredness, spitefulness, and jealousy at the other (Digman, 1990).

Conscientiousness is a trait characterised by adjectives such as efficient, organised, reliable, responsible, and being thorough (McCrae & John, 1992). Typical behaviours associated with conscientiousness include being hard working, achievement orientated, and

persevering (Barrick & Mount, 1991) traits which have been found to be the most highly valued in the workplace (Sackett & Walmsley, 2014).

Neuroticism is a trait characterised by adjectives such as anxiety, self-pitying, tense, touchy, unstable, worrying (McCrae & John, 1992). An individual high in neuroticism is prone to become affected with negative events exhibiting traits such as fear, anger, depression, and be more inclined to experiencing a stress response (Therasa & Vijayabanu, 2015).

Openness to experience is a trait characterised by adjectives such as artistic, curious, imaginative, insightful, original, and wide interests (McCrae & John, 1992). Broadly, it refers to the breadth, depth, originality, and complexity of an individual's mental and experimental life which reflects intellectual and creative functioning (John et al., 2009, p. 138).

The Big Five taxonomy has been used within the work context in various different ways. For example, in relation to job performance and types of occupation valid predictions of extraversion between jobs such as management, sales and teaching have been demonstrated (Barrick & Mount, 1991; Cohrs, Abele, & Dette, 2006). Counterproductive work behaviours have been found between lower extraversion and theft and increased openness to experience as a predictor to sabotage (Bolton, Becker, & Barber, 2010). Meta-analytical techniques have also been used to substantiate the benefits of agreeableness and conscientiousness for team performance in field studies (Bell, 2007). Further discussion on the individual health indices (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence) of interest in relation to the Big Five is found in 6.5.

1.5.3 Core self-evaluation

Although it is acknowledged that the Big Five traits are commonplace in personality research, there is support for development in theoretical approaches which offer more

information about behaviour than single constructs (Mäkikangas, Feldt, Kinnunen, & Mauno, 2013) and attempts to explain personality measures or constructs related specifically to job performance (Schmitt, 2004). Since the late 1990s, research on the contribution of personality dimensions to workers' health and operational effectiveness has evolved to consider the role of additional dimensions beyond the Big Five personality traits (Bono & Judge, 2003).

Within this strand of research, the role of a broad personality construct known as core self-evaluation (CSE) has come to the fore. Core self-evaluations (CSE), has been defined as the fundamental bottom-line evaluations individuals hold about themselves and their capabilities, and the latent (or second-order) factor underlying measures (Judge, Locke, & Durham, 1997a).

Core self-evaluation (CSE) theory is an observation first posited by Packer, an objectivist philosopher and clinical psychologist. Packer (1984) suggested that individuals make general, metaphysical evaluations of themselves which subconsciously affect specific appraisals of people and events and describes these ideas as core evaluations which she defines as 'basic conclusions, bottom-line evaluations that we all hold subconsciously' (p. 3). Extending these ideas, it was proposed that core evaluations of the self are all-encompassing: CSE theory thus posits that subconscious conclusions that individuals reach about themselves influence all other appraisals of the self, others, and the world (Judge, Locke, Durham, & Kluger, 1998b).

Over the past decade, a new research literature has emerged investigating the broad personality construct of core self-evaluations which has integrated the more commonly studied narrower traits. CSE is manifested in traits that adhere to three criteria: Evaluation focus, fundamentality, and scope. Evaluation focus is the extent to which traits involve evaluations of the self (e.g. self-esteem is an appraisal of self-worth) as opposed to descriptions of the self (e.g. agreeableness is a label for behaviours like cooperation and

showing empathy). Fundamentality is the extent to which traits are central to the self-concept. The attribute of fundamentality reflects ideas advanced by personality theorists (Cattell, 1965) that fundamental traits, compared with peripheral traits, have greater interconnectivity with other traits, perceptions, and attitudes. Scope refers to how broad (e.g. general self-esteem) or narrow (e.g. organisation-based self-esteem) a trait is, with the former being more likely to reflect self-based evaluations versus domain-specific evaluations.

According to Judge et al. (1997a), based on these criteria, self-esteem, generalised self-efficacy, emotional stability, and locus of control were provisionally identified as CSE traits. Self-esteem refers to the basic appraisal individuals make of themselves and the overall value that they place on themselves as a person (Kernis, 2003). Self-esteem is an important psychological construct because it is a central component of individuals' daily experience; it refers to the way that people feel about themselves, which reflects and affects their ongoing transactions with their environment and the people they encounter (Kernis, 2003). Self-esteem includes overall self-acceptance, self-liking, and self-respect that is stable over time (Judge, Erez, Bono, & Thoresen, 2003; McCrae & Costa, 1988).

The second CSE trait – generalised self-efficacy – refers to an appraisal of the fundamental ability to perform and cope successfully across a variety of situations (Locke, 1976). Bandura (1997) also defined self-efficacy as the belief that a person has the ability to successfully execute and perform a specific task within a given context. However, generalised self-efficacy differs from Bandura's (1997) definition of self-efficacy; Bandura's (1997) definition is task or situation specific while generalised self-efficacy is global and not focused on a specific situation. Generalised self-efficacy involves the belief that individuals can successfully handle life's urgencies and demands. Also, while Bandura's (1997) task specific self-efficacy can vary somewhat depending on the task, generalised self-efficacy is stable across domains because it results from an accumulation of successes and persistent

positive experiences (Chen, Gully, & Eden 2001). Thus, the general perception of one's ability to perform in any context may spill over into the specific context.

The third CSE trait – locus of control – refers to beliefs about the causes of events in life (Judge et al., 2003; Rotter, 1966): Do individuals control events in their lives or does the environment or fate control events? Thus, individuals with an internal locus of control believe that they are generally in command of the events in their life and their fate is determined by their actions. In contrast, individuals with an external locus of control believe that because the environment or luck controls events, they have no control over those events (Rotter, 1966). Although locus of control is theoretically related to generalised self-efficacy, the two concepts differ. Generalised self-efficacy relates more to confidence about actions or behaviours, while locus of control focuses more on who controls outcomes (Judge et al., 1998b).

Lastly, neuroticism (or, conversely, emotional stability) constitutes the tendency toward emotional distress (e.g. nervousness, hopelessness, and guilt) where the interpretation of the environment can be threatening and thus induce anxiety (Schneider, 2004). Neurotics also tend to focus on negative aspects of self, and thus, view themselves as guilty, timid, or dependent on others. Subsequently, neurotic individuals are prone to be dissatisfied with themselves and with their lives in general (Clark, Watson, & Mineka, 1994; Judge et al., 1998b; McCrae & Costa, 1988). Neuroticism is one of the Big Five personality traits and constitutes the negative pole of emotional stability, which taps the ability to withstand stress (Judge et al., 1998). Emotional stability has been used interchangeably with neuroticism to describe the fourth CSE trait which, according to Judge and Bono (2001), suggests that individuals with low neuroticism have high emotional stability. Neuroticism is also closely related to the negative affectivity trait; the experience of negative emotions and poor self-concept even in the absence of overt stress (Watson & Clark, 1984).

According to Judge et al. (1997a), these four traits are saturated with the underlying CSE construct, which implies that they are interrelated and share similar relations with other variables. In support of this view, empirical findings have verified that the traits are highly correlated (Judge & Bono, 2001; Judge et al., 2003), they load on a higher order factor (Judge et al., 2003; Judge et al., 1998b) and they have similar relations with job satisfaction and organisational performance (Judge, Bono, Erez, & Locke, 2005). Judge and his colleagues (2003) developed the CSE 12 item scale and found it a valid and reliable scale among diverse samples. Up until the development of a CSE Scale (Judge et al., 2003) it had been relatively uncommon for researchers to study the traits together (Judge & Bono, 2001) and despite its short history, numerous studies have shown that CSE is associated with many key organisational and individual outcomes such as job satisfaction, job stress, work engagement, and psychological health (Abikoye & Sholarin, 2012; Best, Stapleton, & Downey, 2005; Brunborg, 2008; Galvin & Smith, 2015; Kahn & Byosiere, 1992; Kammeyer-Mueller, Judge, & Scott, 2009; Salanova, Peiro, & Schaufeli, 2002).

Importantly, in the context of the current investigation it has been demonstrated that the way in which people evaluate themselves affects how engaged they are, and how they assess their work ability. Thus, if a worker has a favourable attitude towards himself, considers himself worthy and respects himself, he is more likely to be enthusiastic about his work, and is more willing to put his energy into work than a colleague with low self-esteem. Moreover, they also have better work ability than their co-workers who tend to evaluate themselves or their job more negatively (Airila et al., 2014).

1.5.4 Gaps in knowledge

In broad terms, there are gaps in knowledge on the relative contribution of work ability and personality traits to occupational outcomes. As Airila et al., (2014) have demonstrated, this is of interest because work ability is a self-evaluated construct. There is

also lack of evidence related to work ability and individual and organisational indices. This is interesting because of the increasing focus of workplace health, wellbeing, and the interventional measures which contribute to provide positive and effective outcomes to productivity (Harrison, 2014; Harrison, 2016). While there is empirical literature on the relationship between personality and performance indicators, such as job satisfaction and work engagement (Judge et al., 1998; Lee & Ok, 2015), there is a paucity of evidence in relation to other organisational performance indices such as psychological distress, job stress, and sickness absence. Studies 2 and 3 will further explore this concept to contribute to the Big Five and CSE literature.

Finally, there is a gap in knowledge with regard to the understanding and use of work ability in the UK. The first study of this investigation will address this gap and the fourth and final study in the investigation will examine in more detail the use of different work ability measures in relation to their practical workplace application.

Chapter Two: Occupational health professionals' knowledge, understanding, and use of work ability (Study 1)

An abridged version of this chapter was published as Coomer, K., & Houdmont, J. (2013). Occupational health professionals' knowledge, understanding, and use of work ability. *Occupational Medicine*, 63, 403-409.

2.1 Abstract

This initial empirical chapter addresses the first objective of the thesis, namely to establish the extent to which the work ability (WA) construct is understood and integrated into contemporary occupational health (OH) practice in the United Kingdom (UK). The study has two specific aims. First, to establish the degree of knowledge, understanding, and use of WA in OH practice in the UK. Comparisons are drawn between the UK situation and that in Finland, from where work ability originates. Second, to identify factors that influence use of WA in Finnish occupational health practice, with a view to examining the scope for these drivers to similarly influence practice in the UK. The study draws on data gathered via an online questionnaire that was administered specifically for purposes of the current doctoral investigation to OH practitioners in the UK and Finland in 2012. A total of 436 UK and 97 Finnish OH practitioners completed the questionnaire. Though familiarity with the term 'work ability' was similar among Finnish and UK respondents, substantial differences were found in the understanding of the term. A total of 90% of Finnish respondents and just 3% of UK respondents reported using the Work Ability Index (WAI), a validated measure of WA, in their practice. Finnish respondents indicated that they used WAI results primarily for individual case management, understanding population health trends, health promotion, and determining WA across age groups. UK respondents primarily attributed failure to use the WAI to a lack of training. Primary factors influencing the use of WA in Finland included it being considered common practice and an effective system by which to conduct individual

assessments. It is concluded that there are statistically significant differences between Finland and the UK in the assessment of WA in occupational health practice and that these may reflect contrasting occupational health legislative frameworks.

These findings provide a valuable empirical insight into the application of work ability in UK OH practice, and indicate that there is considerable scope for development in this regard. One factor that is likely to be influential in stimulating the widespread application of work ability in the UK is the availability of a UK-specific evidence-base on the utility of the construct. At present, there is a paucity of such evidence. In response, the remaining chapters of this thesis present a set of studies that, taken together, have the overall objective of producing an evidence base on the efficacy of work ability in the UK context.

2.2 Introduction

In recent years, the work ability (WA) construct has become an increasingly popular focus of attention in occupational health (OH) research (Löve, Holmgren, Toren, & Hensing, 2012). WA and its associated measurement instrument, the Work Ability Index (WAI), have been used extensively in OH practice in a number of countries including The Netherlands, Belgium and Germany (El Fassi et al., 2013; Hasselhorn et al., 2005; Roelen et al., 2014), in addition to Finland, from where they originate (Lehtinen & Rantanen, 2012; Taskinen, 2004). Anecdotal evidence suggests that OH professionals in the UK have begun to use, or express interest in using, WA in response to its increasingly widespread use in OH research, the gradual accumulation of information from Finland on its potential uses in OH practice, and the challenges presented to OH management by an ageing workforce. (Coomer & Houdmont, 2013).

2.3 Aims of the current study

In light of the challenges produced by an ageing workforce in the UK, and the Finnish and international evidence which demonstrates the utility of WA in OH practice, UK OH

professionals might be expected to have embraced WA. However, the extent to which this is the case remains unclear, and a recent Google Scholar search, using the keyword 'work ability index', produced 1960 articles, of which as far as the researcher is aware only three were UK specific (Bridger & Bennett, 2011; Nachiappan & Harrison, 2005; Reilly, Rees, & Tipton, 2009).

The following paragraph summarises the three UK studies identified starting with Nachiappan and Harrison (2005) who conducted a cross-sectional study to assess work ability among a population of UK health care workers aged 45 years and above ($n = 277$). It was the first study of its kind in the UK and concluded that as age advances, physical work demand on workers should be reduced and mental components of work increased. Reilly et al. (2009) also conducted a cross-sectional study to evaluate the WAI through feedback from users and to compare the WAI score with job satisfaction and retirement's intentions. The study population was employees working for a UK charity ($n = 98$). The study hypothesis of the WAI predicting future work intentions and that WA was a function of job satisfaction was not supported. In addition, the user's evaluation of the WAI led to the conclusion that the instrument was too technical, personal, irrelevant, or vague. The third UK study (Bridger & Bennett, 2011) involved cross-sectional research among seafarers ($n = 41$) to investigate task demands and work ability. The authors concluded that the best predictor of work ability was the interaction between Body Mass Index and age.

The limited body of literature outlined above suggests that WA might not be extensively integrated into OH practice in the UK. However, to date there is no scientific evidence on the extent to which UK-based OH professionals are aware of, understand, and consider WA in their practice. The current study explores these issues among OH nurses and physicians from the UK and Finland. Comparisons are made to highlight possible areas for developing the use of WA in UK OH practice. Therefore, this study has two specific aims.

First, to establish the degree of knowledge, understanding, and use of WA in OH practice in the UK, and to contextualise the findings, comparisons are drawn between the UK situation and that in Finland, from where WA originates. Second, to identify factors that influence the use of WA in Finnish occupational health practice, with a view to examining the scope for these drivers to similarly influence practice in the UK.

2.4 Method

2.4.1 Methodological approach

A quantitative questionnaire-based design was adopted for the current study to gather data from a large sample of OH practitioners in the national contexts under investigation. A quantitative survey was beneficial as it ensured that the same information was collected from each respondent while facilitating data capture from a large number of individuals. In sum, the quantitative design permitted the development of a large-scale descriptive profile of OH practitioners' knowledge, use, and understanding of work ability. Moreover, the quantitative approach allowed for the application of statistical analyses to establish whether significant differences existed between the two national groupings in terms of the variables under consideration.

2.4.2 Procedure and participants

The questionnaire was hosted on a commercial online survey facility (Survey Monkey). The author purchased a subscription specifically for purposes of the studies reported in this thesis. At the time that the studies contained in this thesis were conducted, the University of Nottingham did not require or encourage postgraduate researchers to use the Bristol Online Surveys online survey facility. The online survey was held on a private account and only accessible by the researcher using a private password and user name, thus ensuring confidentiality. Secure Sockets Layer (SSL) encryption was added for additional security and the storage of IP addresses and e-mail addresses was disabled to ensure the

anonymity of the collected data. The online survey data was stored on servers located in the United States, but to comply with European data requirements, such as the Data Protection Act 1998, the online survey facility was certified with the Safe Harbour Framework in 2012 which was designed to comply with EU requirements on the transfer of data from the EU to the US.

UK and Finnish OH practitioners (broadly defined) were invited to complete the survey over a two-month period in 2012. The two groups were selected on the basis that the WAI has been used extensively in the Finnish occupational health context for a number of years, whereas its use in the UK is in its embryonic stages. The questionnaire responses would, therefore, permit cross-border comparisons concerning the use of the instrument. A link to the questionnaire was issued by email to the main bodies representing UK and Finnish occupational health practitioners; these were members of the Society of Occupational Medicine (SOM), the OH nursing register hosted by SOM, the Finnish Association of Occupational Health Nurses (FAOHN), and the Finnish Association of Occupational Health Physicians (FAOHP). In addition, the Jiscmail occupational health mailing list (occ-health@jiscmail.ac.uk) was used, which is an online discussion list focused on research and best practice within occupational health. No reminder e-mails were sent after the initial invitation.

2.4.3 Measures

A questionnaire to explore OH practitioners' knowledge and understanding of WA and use of the WAI was developed and initially pilot tested with four OH nurses and one OH physician from the UK. One OH nurse from Finland agreed to review the questionnaire for grammatical understanding as the questionnaire was written in English; attempts to recruit further OH practitioners from Finland was not successful. There were minor amendments following the pilot in relation to the order of the questions. The final questionnaire comprised

18 items that involved various forms of response scale including multiple choice, Likert-type scale, or a yes/no format. Examples of items included ‘Have you heard of the WAI?’, ‘How did you hear about the WAI?’, ‘Have you ever used the WAI?’, ‘How have you used the WAI?’ and ‘How have the WAI results been used?’ General demographic data was also collected e.g. occupation, age, gender, and years of experience in current speciality. The participant was also asked if they worked in Finland or the UK. Two items involved open-ended responses: ‘What do you understand by the term work ability?’ and ‘If you work in Finland what are the main factors which influence the use of the Work Ability Index in Finland?’ A copy of the questionnaire can be found in Appendix A.

2.4.4 Analytical approach

Data was exported from the online survey facility into SPSS version 20 for quantitative analysis. Responses from Finland and the UK were analysed separately and measures of central tendency and dispersion produced; comparisons between categorical Finnish and UK responses were conducted using Chi-square statistical analysis (13 items). The Chi-square statistic offers a means by which to analyse whether the proportions of individuals reporting a particular outcome in two or more groups differ significantly. The two items involving open-ended responses were analysed using a thematic analysis approach to group responses into categorical themes (Braun & Clarke, 2006). This involved reading and coding participants’ responses into categories that summarise the content of the data. The categories were references to the first item ‘What do you understand by the term work ability?’ and ‘If you work in Finland what are the main factors which influence the use of the Work Ability Index in Finland?’ The three questions designed as a 5-point Likert scale are presented as descriptive statistics in section 2.5.6. While it would have been desirable to conduct Chi-square analyses to compare the proportions of the UK and Finnish respondents reporting each response option, the sample size, particularly for the UK, was too small. Chi-

square analyses are not therefore possible as a sample size needs to be sufficiently large to produce appropriate statistical power (McHugh, 2013).

2.4.5 Ethical considerations

The main professional organisation governing psychology within the UK is The British Psychological Society (BPS). The BPS document: 'Code of Ethics and Conduct' (2009) was used to provide guidance for the researcher. As the research was conducted from a university base, the ethical procedures of the university were also considered. This involved obtaining ethical approval from the research ethics committee of the Institute of Work, Health and Organisations at the University of Nottingham. The following was considered in the application;

Consent. Informed consent involves the researcher providing participants with sufficient information about the research to enable them to decide if they wish to take part, without any coercion. The participant then enters into a contract with the researcher. In this study, the aims were explained to each participant, in the e-mail and on the first page of the questionnaire. Consent was considered to have been given by the act of completing the questionnaire which is supported by the BPS (2009) for anonymised at source, non-sensitive data. There were no incentives offered for participation and it was clearly communicated that participation was voluntary; individuals did not have to participate if they did not want to and they could cease to complete the questionnaire at any point.

Confidentiality. In accordance with BPS (2009), guidance assurance was provided on anonymity, but also an explanation that the results of the study may form the basis of a future academic article. The researcher is registered with the Information Commissioners Office, and is familiar with the requirements of the Data Protection Act 1998, but all participants were informed that all data would be stored in accordance with the Data Protection Act 1998 and only available to the researcher and research supervisor.

Protection. All participants were advised to contact their GP or primary care professional if they felt distressed by participating in the research study. Contact details were also provided of the researcher and research supervisor and, in accordance with the BPS (2009) guidance on debriefing, the opportunity to obtain a summary of the overall results of the study was offered.

2.5 Results

2.5.1 Data available for analysis

The questionnaire was completed by 436 OH nurses and physicians who worked exclusively or primarily in the UK and 97 who worked in Finland. In total, 57 questionnaires were discarded as the respondents did not meet the eligibility criteria of working as OH practitioners or worked in countries other than Finland or the UK.

2.5.2 Response rates

It is acknowledged that studies involving nurses, physicians, and allied professionals are generally characterised by low and declining response rates (Cho, Johnson, & van Geest, 2013). In this current study, access to membership information for participating groups was difficult to obtain, but where possible response rates have been calculated using information available in the public domain, other studies using the same study population, and personal communications.

The Finnish Association of Occupational Health Nurses (FAOHN) sent an e-mail invitation to participate in the survey to all occupational health nurses on their membership list; this was approved by their ethics committee. It was not possible to obtain an accurate indication of how many OH nurses it was sent to, and whether the membership list was up to date, as OH nurses update their own data via the website, including e-mail addresses. However, research conducted by Kinnunen-Amoroso and Liira (2014) used the same membership list from the FAOHN for their study population and record that their invitation

request was sent, via e-mail, to 1,419 OH nurses and received a response rate of 30%; 290 of the e-mail addresses were not delivered to recipients. On this basis the current study produced an approximate response rate of 4% for the Finnish sample.

The FAOHP reports a membership of 1,650 occupational health physicians (<https://www.stly.fi/englanninkieliset>). After approval from their ethics committee, the membership list was used to send the survey via e-mail invitation, but it was not possible to obtain an accurate number of how many OH physicians it was sent to or how many were undelivered; similarly to the FAOHN, the OH physicians are required to update contact details, including e-mail addresses, directly via the website. Research conducted by Kinnunen-Amoroso & Liira (2013) used the same FAOHP membership list and reported a response rate of 23% based on 954 e-mail invitations. A response rate of this current study based solely on the reported membership number available from the FAOHP website is therefore 3%. A response rate for this current study based on a comparable study (Kinnunen-Amoroso & Liira, 2013) using the same membership list is calculated at 5%.

The OH Nurse Register is a mailing list for UK occupational health nurses hosted by the Society of Occupational Medicine; 1,694 OH nurses are registered on the list. After steering group approval, it was used to send e-mail invitations to participate in the study. It was not possible to establish whether there were any undelivered e-mail addresses. Additionally, a Jiscmail occupational health mailing list (occ-health@jiscmail.ac.uk) was used which had approximately 1,000 subscribers, but it is feasible that there was a cross subscription of both mailing lists by some OH nurses leading to replication of both the OH Nurse Register and Jiscmail. The risk of a participant sending more than one response to the survey was negligible because of the deactivation of the multiple responses functionality in Survey Monkey during the design of the survey; the participant could therefore only take the survey once per email address. A response rate based solely on the OH Nurse Register

mailing list is 19%. The only other comparable study using the same OH Nurse Register mailing list reports a response rate of 60% (Kirk, 2012). This is a considerably higher response rate than this current study, and is likely to be reflected by the professional interest on the study subject area of advanced OH nursing practice by Kirk (2012).

The Society of Occupational Medicine reports retrospectively (accurate information was not available in 2012) that there were 1,708 members in 2012 (N. Pahl, personal communication, January 23, 2017). After ethical committee approval, an e-mail invitation to participate in the study was sent to members; undelivered e-mail invitations were not recorded. A response rate for this current study based solely on the reported membership number of 1,708 is therefore 6%.

2.5.3 Generalisability

The extent to which the findings from this study can be demonstrated to represent the wider population of Finnish OH nurses and physicians, and UK OH nurses and physicians, is difficult to establish as there is no standard readily obtainable data on which to compare the population of OH physicians and nurses in the different countries, particularly with regard to demographic characteristics such as age and gender. Additionally, in the UK there is no systematically collected data on the size of the OH nursing workforce. The Nursing and Midwifery Council (NMC) records validated OH qualifications on the Specialist Community Public Health Nursing (SCPHN) register, but as OH nurses in the UK do not legally have to hold an OH qualification in order to practice OH, this figure this can be only an approximation of the population of OH nurses in the UK. This is demonstrated by the results of a more recent OH nurse survey where 24% ($n = 386$) of practising OH nurses report that they are not on the SCPHN register (Ballard & Coomer, 2016). As a result of these knowledge gaps, findings of the current study should be generalised with caution.

2.5.4 Differences between the two study groups

Respondents' demographics and occupational characteristics are presented in Table 2.1. Eighty percent of the study population was between the age range of 40-59 years for the UK and 62% for Finland. For both countries, the dominant gender in the study population was female (UK, 77%; Finland, 73%) and the dominant occupation was OH nurse (UK, 77%; Finland 52%). Chi-square analyses were conducted to ascertain whether there was a difference between the datasets of Finland and the UK. This is presented in Table 2.1. There was a statistically significant difference between the age profile of Finland and the UK ($p < .001$). There was no statistical difference in terms of gender. In both samples, OH nurses comprised the largest portion of respondents, though the proportions differed significantly with 77% of Finnish and 52% of UK respondents being OH nurses.

Table 2.1
Study 1 Respondent Demographic and Occupational Characteristics

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	<i>P</i> value
Age (years)			19.47	.001
20-29	2 (<1)	2 (2)		
30-39	42 (10)	20 (20)		
40-49	166 (38)	30 (31)		
50-59	183 (42)	30 (31)		
60+	37 (8)	15 (16)		
Not specified	6 (1)	-		
Gender			.365	.37
Male	98 (22)	26 (27)		
Female	335 (77)	71 (73)		
Not specified	3 (1)	-		
Occupation			25.63	.000
OH nurse	336 (77)	50 (52)		
OH physician	100 (23)	47 (48)		

Note. UK – United Kingdom. FI = Finland

A power calculation was undertaken using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) which indicated that a minimum overall sample of 220 cases was required for Chi-square analyses. As the sample for the study exceeded 220, Chi-square analyses were therefore conducted. Descriptive statistics were used to describe the three Likert questions as the sample response rate to these questions was too low to successfully use Chi-square. The descriptive statistical data is presented in Tables 2.11 – 2.13.

Have you heard of the WAI? – To investigate differences between the UK and Finnish samples in relation to the question ‘Have you heard of the WAI?’, a Chi-square statistic was conducted after checking that assumptions of the statistical test were met. Ninety-four percent of Finnish and 39% of UK respondents had heard of the WAI ($p < .001$). This is presented in Table 2.2.

Table 2.2

Have you heard of the WAI?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
Have you heard of the WAI?			100.094	.001
Yes	179 (39)	95 (94)		
No	275 (60)	6 (6)		

Note. UK = United Kingdom; FI = Finland

How did you hear about it? – To investigate the differences between the Finnish and UK samples in relation to the question ‘How did you hear about the WAI?, a Chi-square statistic was conducted. The survey descriptive results demonstrate that in the UK, the respondents aware of the WAI had heard about it from reading journals (25%), their own OH practice (12%), at a presentation/conference (8%), on a training course, (2%), through their own research (2%), and using it in the organisation that they work (2%). In Finland 85% use it in the organisation that they work, 36% use it in their own practice, 28% had heard about it on a training course, 27% had heard about it in a presentation/conference, 23% had heard about it through reading journals, and 15% through their own research. Both datasets report hearing about it in another way; UK (4%) and the Finland (3%). All the results, except for reading journals ($p = .614$) and other ($p = .845$), indicate that the respondents from Finland and the UK are significantly different ($p = <.001$). This is presented in Table 2.3.

Table 2.3

How did you hear about the WAI?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
How did you hear about the WAI?				
Reading journals	115 (25)	23 (23)	.254	.614
Training course	9 (2)	28 (28)	90.485	<.001
At a Presentation	37 (8)	27 (27)	28.294	<.001
Own OH practice	56 (12)	36 (36)	33.002	<.001
Own research	8 (2)	15 (15)	36.022	<.001
Used in the organisation I work	10 (2)	86 (85)	398.896	<.001
Other	18 (4%)	3 (3)	.336	.845

Note. UK = United Kingdom; FI = Finland

Have you ever used the WAI? To investigate the population study differences to the question ‘Have you ever used the WAI?’, a Chi-square statistic was conducted. Among UK respondents, 3% had used the WAI, whereas 91% reported its use in Finland ($p < .001$). This is presented in Table 2.4.

Table 2.4

Have you ever used the WAI?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
Have you ever used the WAI?			416.176	<.001
Yes	13 (3)	91 (91)		
No	170 (37)	5 (5)		

Note. UK = United Kingdom; FI = Finland

How have you used the WAI? To investigate differences to the question between the UK and Finnish samples ‘How have you used the WAI?’, a Chi-square statistic was conducted. The results demonstrate that, in the UK, less than 1% of respondents used the WAI for health surveillance, workplace health promotion, research, and ageing at work programmes, and 2% reported its use in case management. In contrast, 71% Finnish respondents use it for case management, 62% in work health promotion, 55% in health surveillance, 21% in ageing at work programmes, 20% as a research tool and 6% report other. All the results indicate statistically significant differences between the UK and Finnish samples ($p < .001$). This is presented in Table 2.5.

Table 2.5

How have you used the WAI?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
How have you used the WAI?				
Health surveillance	1 (0.2)	56 (55)	275.630	<.001
Workplace health promotion	3 (0.7)	61 (62)	297.464	<.001
OH case management	10 (2)	72 (71)	315.696	<.001
Research tool	6 (1)	20 (20)	63.806	<.001
Ageing at work programme	3 (0.7)	21 (21)	81.663	<.001
Other	0 (0)	7 (6)	55.610	<.001

Note. UK = United Kingdom; FI = Finland

Did you find the WAI straightforward to use? To investigate differences between the UK and Finnish samples to the question ‘Did you find the WAI straightforward to use?’, a Chi-square statistic was conducted. The results demonstrate that 86% of Finnish and 2% of UK respondents found the WAI straightforward to use. This is presented in Table 2.6.

Table 2.6

Did you find the WAI straightforward to use?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
Did you find the WAI straightforward to use?			417.960	<.001
Yes	11 (2)	87 (86)		
No	2 (0.4)	4 (4)		
Don’t know	445 (97)	10 (10)		

Note. UK = United Kingdom; FI = Finland

Which version did you use? To investigate differences between the UK and Finnish samples to the question ‘Which version did you use?’, a Chi-square statistic was conducted, although for this question the sample was below the minimum power calculation of 220 respondents so

the results need to be interpreted with caution. The number of UK responses was low ($n = 13$), but nevertheless all three versions were reported as being used: Long version (39%), short version (46%), and single item version 15%). Among the Finnish sample ($n = 87$) 62% report using the long version, 35% using the short version, and 3% the single item version. Comments under the category ‘other’ (UK = 2%, Finland = 12%) related to the use of modified versions. The results indicate that the differences between the dataset of Finland and the UK are not statistically significant ($p = .94$). This is presented in Table 2.7. Further explanation regarding the different versions is found in Study 2 (Chapter 3) and Study 4 (Chapter 5).

Table 2.7

Which version did you use?

	UK n (%)	FI n (%)	X^2	P value
Which version of the WAI did you use?			4.719	.094
The short version	6 (46)	30 (34)		
The long version	5 (38)	54 (62)		
Single item	2 (15)	3 (3)		
Other	1 (2)	13 (12)		

Note. UK = United Kingdom: FI = Finland

How have the results of the questionnaire been used? To investigate differences between the samples to the question ‘How have the results of the questionnaire been used?’, a Chi-square statistic was conducted. Given the limited extent to which the WAI is used in the UK, the number of responses from UK participants was low. ‘To help rehabilitation back to work’ was the most reported response ($n = 10$), the other responses were either 1% (‘understanding health trends at individual’, ‘understand the work ability of all ages and research for a WA project’) or less than 1% (‘understand health trends at a working population level’, ‘understand the WA of older employees’, ‘predicting sickness absence’, ‘contributing towards health promotion and wellbeing initiatives in the workplace’). The percentage rate of the Finnish respondents ranged from 78% (‘understanding health trends at an individual level’) to 11% (‘understanding the work ability of younger employees’). There was a statistically significant difference between the datasets of Finland and the UK ($p < .001$). This is presented in Table 2.8.

Table 2.8

How have the results of the questionnaire been used?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
How have the results of the questionnaire been used?				
Understand health trends at an individual level	7 (1)	79 (78)	373.861	<.001
Understand health trends at a working population level	4 (0.9)	64 (63)	302.462	<.001
To help rehabilitation back to work	10 (2)	52 (52)	203.974	<.001
Understand the work ability of older employees	3 (0.7)	29 (29)	120.711	<.001
Understand the work ability of younger employees	0 (0)	11 (11)	50.882	<.001
Understand the work ability of all ages	5 (1)	63 (62)	290.877	<.001
To predict sickness absence	3 (0.7)	41 (41)	182.026	<.001
Contribute towards health promotion and wellbeing initiatives in the workplace	4 (0.9)	58 (58)	271.209	.001
For a research project on work ability	5 (1)	21 (21)	72.418	<.001

Note. UK = United Kingdom; FI = Finland

Who do you think should be able to use the WAI? To investigate between the UK and Finnish samples differences to the question ‘Who do you think should be able to use the WAI?’, a Chi-square statistic was conducted. Both Finnish and UK respondents identified OH nurses and physicians as the two main groups that ought to use the instrument. There was a statistically significant difference between the datasets of Finland and the UK for four of the responses (OH nurses, OH physicians, researcher with nursing/medical background and H&S practitioners) ($p < .001$) and primary care practitioners and the ‘other’ category at less than 5% ($p < .05$). The views from the respondents of five other professional groups were not statistically significant. This is presented in Table 2.9.

Table 2.9

Who do you think should be able to use the WAI?

	UK <i>n</i> (%)	FI <i>n</i> (%)	X^2	P value
Who do you think should be able to use the WAI?				
OH nurses	148 (32)	93 (92)	120.516	<.001
OH physicians	146 (32)	84 (83)	89.898	<.001
Managers	59 (13)	8 (8)	1.931	.165
Union representatives	29 (6)	6 (6)	0.22	.883
Researchers (with nursing/medical background)	93 (20)	72 (71)	103.382	<.001
Researchers (with no nursing/medical background)	49 (11)	17 (17)	2.989	.084
HR practitioners	57 (13)	17 (17)	1.366	.242
Primary care practitioners	104 (23)	33 (33)	4.442	.035
H&S practitioners	58 (13)	26 (26)	11.086	<.001
Other	13 (3)	0 (0)	2.935	.087
Don't know	32 (7)	1 (1)	5.357	.021

Note. UK = United Kingdom; FI = Finland

2.5.5 Understanding of the term work ability

Data is presented in the form of frequencies in Table 2.10. Understanding of the term ‘work ability’ however was diverse. Using a thematic analysis approach, the responses were read, reread, and then coded into eight categorised themes of health and work balance, biopsychosocial, fitness to work, health and life balance, the ability to work, wellbeing, performance standards, and functional assessment. The percentage frequencies are presented in Table 2.10.

Table 2.10

Understanding of the Term 'Work Ability'

	FI <i>n</i> (%)	UK <i>n</i> (%)
Health and work balance	26 (28)	75 (20)
Biopsychosocial	18 (19)	9 (2)
Fitness to work	17 (18)	67 (18)
Health and life balance	11 (12)	0
Ability to work	11 (12)	144 (38)
Wellbeing	7 (7)	1(<1)
Performance standards	4 (4)	22 (6)
Functional assessment	0	64 (17)

Note. UK = United Kingdom; FI = Finland

Among the UK sample, WA was primarily understood to be an indicator of ability to work, while health and work balance were the most common response from the Finnish sample. Factors reported by Finnish respondents as influencing use of the WAI in OH practice included the following (in descending order): Its use being common practice; offering an effective system for individual health checks; and providing opportunities for organisational trend analyses, organisational policy and procedure, future workforce planning, rehabilitation, disability assessment and health promotion. Two percent of the Finnish sample indicated they did not like using the WAI in their practice.

2.5.6 Using the WAI

Responses to the three Likert questions of Why did you find the WAI straightforward to use, reasons for why the WAI was not straightforward to use, and why have you not used the WAI are presented in the form of descriptive statistics. The responses to the three questions were funneled from the questions of 'Have you ever used the WAI?' and 'Did you find the WAI straightforward to use?' Respondents were asked to respond to questions within the category of the overall question, e.g. within the category 'Why did you find the WAI straightforward to use?' sub questions were asked such as 'the questions were clear to the

administrator, the questions were clearly understood by the employees, the questions were perceived as relevant by the employee and it is easy to analyse. The percentage data presented in Tables 2.11–2.13 relates to the number of respondents who responded to the statements (strongly agree, agree, don't know, disagree, strongly disagree) of the Likert scale rather than an overall percentage of the survey respondents.

Of those that responded to the question 'Why did you find the WAI straightforward to use', there was a low response rate by UK respondents ($n = 11$, 3%) and 'If the WAI was not straightforward to use was it because?' ($n = 7$, 2%) which corresponds with the UK response rate of 3% to the question 'Have you used the WAI'. In contrast, there was a high response rate from the Finnish respondents; 87% ($n = 86$) to the question 'why did you find the WAI straightforward to use?' and up to 45% ($n = 43$) to the question 'If the WAI was not straightforward to use was it because?'. Of those that answered the questions, the responses to the sub questions within each category of question indicated that both the UK and Finnish respondents largely strongly agreed/agreed that the WAI was straightforward to use in relation the specific questions of being clear, relevant, and easy to analyse and disagreed/strongly disagreed to questions which conversely asked 'if the questions were not clearly understood, were perceived as irrelevant and was not easy to analyse. Data is presented in Tables 2.11 and 2.12.

Table 2.11

Why did you find the WAI straightforward to use?

	Strongly agree <i>n</i> (%)	Agree <i>n</i> (%)	Don't know <i>n</i> (%)	Disagree <i>n</i> (%)	Strongly disagree <i>n</i> (%)
The questions were clear to the questionnaire administrator					
UK	3 (27)	8 (73)	0 (0)	0 (0)	0 (0)
FI	32 (37)	51 (59)	2 (2)	1 (1)	0 (0)
The questions were clearly understood by the employees					
UK	1 (9)	9 (82)	0 (0)	1 (9)	0
FI	20 (23)	59 (69)	3 (4)	4 (5)	0
The questions were perceived as relevant by the employee					
UK	1 (9)	8 (73)	2 (18)	0 (0)	0 (0)
FI	12 (14)	54 (63)	15 (17)	5 (6)	0 (0)
It is easy to analyse					0
UK	3 (27)	7 (64)	1 (9)	0 (0)	0 (0)
FI	38 (44)	43 (49)	4 (5)	2 (2)	0 (0)

Note. UK = United Kingdom; FI = Finland.

Table 2.12

If the WAI was not straightforward to use was it because?

	Strongly agree <i>n</i> (%)	Agree <i>n</i> (%)	Don't know <i>n</i> (%)	Disagree <i>n</i> (%)	Strongly disagree <i>n</i> (%)
The questions were not clear to the questionnaire administrator					
UK	0 (0)	0 (0)	1 (14)	5 (71)	1 (14)
FI	0 (0)	2 (5)	2 (5)	26 (61)	13 (30)
The questions were not clearly understood by the employees					
UK	0 (0)	1 (14)	2 (29)	3 (43)	1 (14)
FI	1 (2)	8 (18)	4 (9)	20 (46)	11 (25)
The questions were perceived as irrelevant by the questionnaire administrator					
UK	0 (0)	1 (14)	1 (14)	4 (57)	1 (14)
FI	0 (0)	2 (5)	6 (14)	23 (55)	11 (26)
The questions were perceived as irrelevant by the employees					
UK	1 (14)	1 (14)	0 (0)	4 (57)	1 (14)
FI	2 (5)	7 (16)	6 (14)	20 (47)	8 (19)
It is not easy to analyse					
UK	0 (0)	2 (29)	1 (14)	1 (14)	3 (43)
FI	1 (2)	1 (2)	6 (14)	17 (40)	18 (42)

Note. UK = United Kingdom; FI = Finland.

Of those who responded to the question ‘Why have you not used the WAI?’, 89% of UK respondents strongly agreed/agreed that lack of training contributed to not using the WAI while 35% strongly agreed/agreed that WA was not currently a priority. The remaining responses – it is too expensive to use, it is too time consuming, the organisation(s) I work with would not support its use, and it would not add value to my practice – attracted a large proportion of ‘don’t know’ responses. There was an overall survey response rate of just 4% ($n = 4$) from Finnish OH practitioners for this question. Data is presented in Table 2.13.

Table 2.13

Why have you not used the WAI?

	Strongly agree <i>n</i> (%)	Agree <i>n</i> (%)	Don't know <i>n</i> (%)	Disagree <i>n</i> (%)	Strongly Disagree <i>n</i> (%)
I have not had any training					
UK	76 (50)	60 (39)	5 (3)	9 (6)	3 (2)
FI	0 (0)	1 (25)	1 (25)	2 (50)	0 (0)
It is too expensive to use					
UK	0 (0)	5 (4)	120 (84)	11 (8)	7 (5)
FI	0 (0)	0 (0)	1 (25)	2 (25)	0 (50)
It is too time consuming					
UK	1 (<1)	15 (10)	111 (77)	13 (9)	5 (3)
FI	0 (0)	1 (25)	1 (25)	1 (25)	1 (25)
The organization (s) I work with would not support its use					
UK	4 (3)	18 (12)	82 (56)	34 (23)	9 (6)
FI	0 (0)	1 (25)	0 (0)	2 (50)	1 (25)
It would not add value to my practice					
UK	3 (2)	12 (8)	72 (50)	50 (35)	8 (6)
FI	0 (0)	1 (33)	1 (33)	0 (0)	1 (33)
Work ability is currently not a priority					
UK	4 (3)	46 (32)	36 (25)	43 (30)	17 (12)
FI	0 (0)	0 (0)	0 (0)	2 (68)	1 (33)

Note. UK = United Kingdom; FI = Finland.

2.6 Discussion

2.6.1 Summary of findings

This study is the first of its kind to examine UK OH practitioners' knowledge, understanding, and use of WA and the WAI in their professional activities. Data was collected from OH practitioners in Finland (from where the WA concept originates) to provide context and a basis for comparison. The findings indicated that knowledge and understanding of the WA concept were high, and use of the WAI was viewed as common practice among responding Finnish OH professionals; in contrast, only 39% of UK respondents knew of the WAI, and even fewer (3%) had used it. Lack of training was viewed by UK respondents as a barrier to the expanded use of WA and the WAI in UK OH practice. Finnish respondents indicated a number of factors influencing the use of the WAI in OH

practice which included, at primary level, the identification of organisational trends which then inform organisational policy and procedure and future workforce planning. At secondary level, it was used for individual health checks, rehabilitation, disability assessment, and health promotion.

2.6.2 Implications of the current study

This study did not seek to identify possible factors underpinning disparities between UK and Finnish respondents in understanding and applying WA. Future research might usefully explore whether the differences identified reflect contrasting OH systems and practice in these countries. Indeed the promotion of WA is enshrined in the Finnish Occupational Health Care Act of 2002 and the Occupational Safety and Health Act of 2003, which state that ‘Maintaining work ability during ageing is our common goal’. No such provisions exist in UK legislation. Moreover, Finnish employers are required to provide an OH service (Lehtinen & Rantanen, 2012). In the UK, where no such requirement exists, it is estimated that up to 70% of workers have no access to OH services (Faculty of Occupational Medicine [FOM], 2010). As such, opportunities for UK-based OH practitioners to use WA are fewer.

The study found that all three versions of the WAI were utilised by OH practitioners in Finland and the UK. Among UK respondents, the short version was the most commonly used; among Finnish respondents, it was the long version. Both samples reported that the single item version was rarely used. This is perhaps surprising given the benefits associated with the use of brief questionnaires, including minimising interruption to organisational activities, reduced cost, and promotion of a strong response rate (Edwards et al., 2002; Edwards, Roberts, Sandercock, & Frost, 2004) and ease of interpretation. A review of WA literature has identified that, despite the findings of this study, the single item version was rarely used in practice but it is being increasingly used by researchers in work ability studies.

This observation led to a comparative examination of the single and short version of the WAI to further contribute to the empirical evidence on the reliability and validity of the short and single item versions of the WAI and possible use in OH practice. The findings of this study are reported in Study 4 (Chapter 5). It is also an interesting observation that in practice the long version was the most commonly used among Finnish respondents (62%), but in the WA research literature it is very rarely used as demonstrated by Tables E1–E5 in Appendix E. This could reflect the initial training that Finnish respondents received on the use of the long WAI and the motivation of researchers to use a shorter version for reasons already discussed.

There is evidence to suggest that UK OH physicians cite the primary reasons for failing to use questionnaires in their practice as lack of availability, insufficient time, negative attitudes towards questionnaires, insufficient evidence base, and lack of endorsement by the Faculty of Occupational Medicine (Bailey, 2008). The existence of extensively validated short and single item versions might generate further opportunities for OH practitioners to use WA in their activities, particularly in the UK where the concept is at present relatively novel and untested. Workplace interventions, to improve WA, have so far failed to demonstrate significant benefits (van den Berg et al., 2008) suggesting that further research in this regard is also required for WA to be accepted more widely. In addition, it is suggested that economic evaluation will increasingly play a role in decisions about OH interventions (Burdorf, 2007). With these research needs in mind, further research is necessary with a view to contributing to the evidence base to support the application of WA and the WAI in UK OH practice.

2.6.3 Limitations of the current study

The study was limited by the fact that it was not possible to sample from the entire population of OH nurses and physicians in Finland and the UK. Hence the views expressed

may not reflect those of these populations as a whole. It is also possible that the exclusive use of English in the questionnaire may have presented a barrier to completion for some Finnish respondents although English is encountered on a daily basis by 80% of Finns and, in addition, 84% of health care workers are reported to use it both at work and during their free time (Leppanen et al., 2011). Further, it is possible that self-report bias may have produced an idealised view of practice (Adams, Soumarai, Lomas, & Ross-Degnan, 1999).

The participants were informed in the study introductory sheet that participation was voluntary, they did not have to participate if they did not want to and they could withdraw from completing the questionnaire at any point. In retrospect, it would also have been appropriate to clarify that although they could withdraw from the study during completion, once submitted (online), it would have been impossible to withdraw as the responses were anonymous and their response would have been impossible to identify.

The response rate was low. However, a power calculation to establish the minimum sample size required to conduct the Chi-square statistical tests was satisfactory in the majority of the responses to the questions. Non-response has two main causes: Not being able to contact people, or when contacted, people refuse to participate (Vercruyssen, Roose, Carton, & Putte, 2014). With regard to contact, a pragmatic approach was taken to recruit respondents by the use of mailing lists from the professional bodies of the OH practitioners. As the OH respondents were e-mailed directly from the professional organisations, it was not possible to monitor undelivered e-mails or send reminders, so, as suggested by Vercruyssen et al. (2014), not being able to contact people is a consideration in this study for the low response rate. Other factors to consider is the feeling of being too busy, and having no time (Cho et al., 2013; Vercruyssen et al, 2014), particularly as it is acknowledged that most health professionals lead busy and demanding lives (Tillet, 2003). The contribution of other

competing priorities, such as the increasing volume of surveys that clinicians, in particular, are asked to respond is also noted by Cho et al. (2013) as additional barriers to participation.

To build on this exploratory quantitative study, a qualitative design in the form of focus groups for Finland and the UK could therefore have been considered to contribute further meaningful data in view of the low response rate.

2.6.4 Summary

The current chapter has provided a valuable empirical insight into the application of work ability in UK OH practice. Crucially, the study has shown that there is considerable scope for development in this regard. Findings on the limited understanding and use of work ability in the UK combined with information derived from occupational health practitioners in Finland (where work ability is firmly embedded in practice) point towards there being scope to expand the use of work ability in UK occupational health practice. However, such expansion is only likely to occur in response to the availability of a UK-specific evidence-base on the utility of work ability and agreement on the definition. At present, there is a paucity of such evidence. In response, the remaining chapters of this thesis present a set of studies that, taken together, have the overall objective of producing an evidence base on the efficacy of work ability in the UK context.

Chapter Three: The cross-sectional contribution of work ability and personality to worker health and operational effectiveness (Study 2)

3.1 Abstract

Recent occupational health research has indicated that work ability and dimensions of personality might make important contributions to explaining workers' health and organisational effectiveness. This chapter reports on a cross-sectional survey-based study (Study 2) that was conducted as part of the investigation on which the thesis is based. The primary aim of the study is to explore the extent to which work ability accounts for variance in a host of individual health indices (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence). A secondary aim is to examine the extent to which personality might account for additional variance in these indices over and above that accounted for by work ability. The study draws on data collected via a questionnaire that was administered to employees of four manufacturing organisations in the United Kingdom. A total of 333 employees completed the questionnaire and bivariate correlations and hierarchical linear regression analyses were applied to a sample of 311 usable responses. Results indicated that the vast majority of explained variance in the dependent variables was attributed to work ability, though for all outcome variables – with the exception of sickness absence – at least one personality dimension explained a significant additional portion of the variance over and above that explained by work ability.

This is the first study to have examined relationships between work ability and personality on the one hand, and individual health and organisational effectiveness constructs on the other. However, the cross-sectional design prevents the drawing of firm conclusions on the direction of causation between variables. Thus, longitudinal analyses are required to confirm the current findings; such are presented in Chapter 4.

3.2 Introduction

Based on the stress-strain concept (Karasek, 1979), work ability was initially defined as a worker's capability to manage job demands (Ilmarinen et al., 1991). More recently, work ability has been described within a comprehensive conceptual model that reflects the interaction between an individual's human resources and work factors (Figure 1.1) (Ilmarinen et al, 2005). In the context of work ability, human resources can be described as (1) health and functional capacities (physical, mental, social), (2) education and competence, (3) values and attitudes, and (4) motivation. This comprehensive set of individual factors is related to (5) work demands (physical, mental), (6) work community and management, and (7) work environment.

The association between individual human resources and aspects of work in relation to work ability have been explored in previous research. This includes research on individual personal resources, of interest in this study, which demonstrate that psychological distress is highly correlated with work ability (Guidi, Bagnara, & Fichera, 2012). There is also found to be a correlation between stress symptoms and work ability (Kloimüller, Karazman, Geissler, Karazman-Morawetz, & Haupt, 2000). Internal locus of control could be a moderator in the work stress and work ability relationship (Bethge & Radoschewski, 2010), while job satisfaction has been found to be predictive of ability to work (Palermo, Fuller-Tyszkiewicz, Walker, & Appannah, 2013). With reference to organisational outcomes, positive work engagement has been associated with the preservation of work ability in recent studies (, Hakanen, Punakallio, Lusa, & Luukkonen, 2012; Mache, Danzer, Klapp, & Groneberg, 2013) and the prediction of sickness absence using the work ability index has also been demonstrated. (Hoonakker & Van Duivenbooden, 2012; Kujala et al., 2006).

Research examining associations between personality and facets of employee health and organisational effectiveness has been dominated by the use of the five-factor model of

personality, known as the Big Five (Furnham, 2008, p. 121). This model specifies five distinct traits or dimensions of personality: Neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (McCrae & John, 1992). The accumulated research evidence demonstrates significant relationships between the three dimensions of neuroticism (Alarcon, Eschleman, & Bowling, 2009; Langelaan, Bakker, van Doornen, & Schaufeli, 2006), conscientiousness (Hurtz & Donovan, 2000) and agreeableness in jobs which require interpersonal interactions (Hurtz & Donovan, 2000) and work engagement. Conscientiousness has been associated with job satisfaction (Furnham, Eracleous, & Chamorro-Premuzic, 2009; Judge, Heller, & Mount, 2002;).

Since the late 1990s, research on the contribution of personality dimensions to workers' health and operational effectiveness has evolved to consider the role of additional dimensions beyond the Big Five personality traits (Bono & Judge, 2003). Within this strand of research, the role of a broad personality construct known as core self-evaluation (CSE) has come to the fore. CSE theory posits that subconscious conclusions that individuals reach about themselves influence appraisals of the self, others, and the world (Judge et al., 1998). Numerous studies have demonstrated the utility of CSE in the prediction of individual health and organisational effectiveness. For instance, in a study of Norwegian employees, Brunborg (2008) found that CSE accounted for a large additional portion of the variance (9%) in job stress over and above that accounted for by the demand, control, and support elements of the job demand control support (JDCS) model (Karasek & Theorell, 1990). In line with this finding, in a review of the literature Bono and Judge (2003) found consistent relationships between CSE and both job satisfaction and job performance. In the period since Bono and Judge's (2003) literature review, a number of studies have demonstrated a unique contribution of CSE to the prediction of health outcomes. For example, Tsaousis et al. (2007) found that CSE accounted for 3% of the variance in physical health and 7% of the variance in

psychological health above and beyond that accounted for by subjective wellbeing, leading to the conclusion that “It becomes evident that the way that individuals make inferences about themselves seems to affect...their physical and psychological condition” (p. 1449). Similar findings have been found among Japanese workers (Piccolo, Judge, Takahashi, Watanabe, & Locke, 2005).

In light of the growing body of evidence for the unique and important role of CSE in the prediction of health and performance outcomes, calls have been made for researchers concerned with the examination of relations between personality and work outcomes to incorporate measures of CSE alongside measures of the traditionally dominant personality taxonomies such as the Big Five. Bono and Judge (2003) suggest that there is value to be found in considering CSE alongside the Big Five because “core self-evaluations appear to play an important role in attitudes and behaviour at work” (p. 10) and “core self-evaluations represent a piece of the personality domain that is not adequately captured in the Big Five” (p. 11). Indeed, although there is some overlap between the two constructs, with neuroticism featuring in each, the two are largely conceptually distinct with constructs such as self-esteem featuring only in the broad CSE perspective. The notion of there being a conceptual distinction between CSE and the Big Five was upheld by the findings of a literature review on the two approaches to the measurement of personality, leading the authors to conclude that “The Judge and Bono (2001) meta-analysis makes it clear that we can do a much better job of predicting job performance if we consider core self-evaluations, rather than focusing only on the Big Five” (Bono and Judge, 2003, p. 15). Indeed, Bono and Judge’s (2003) review of the literature demonstrated that while the relationship between CSE and job performance was broadly equivalent in strength to the relationship between the Big Five personality traits and job performance, the relationship with job satisfaction was stronger for CSE than the Big Five. Studies conducted since that time suggest that CSE makes a unique contribution to

explaining work outcomes over and above that explained by the Big Five and that the two personality constructs should be considered in tandem in future organisational research. For instance, in a study of German employees, Stumpp, Muck, Hulsheger, Judge, and Maier (2010) found that CSE explained an additional portion of the variance in job satisfaction, organisational commitment, and life satisfaction over and above that accounted for by the Big Five. On the basis of these findings and conclusions, the current study considers the additional variance in individual health and organisational effectiveness outcomes explained by CSE over and above that explained by the Big Five. Together, these approaches to the measurement of personality offer a broad perspective on the contribution of personality dimensions on the prediction of work outcomes.

3.3 Aims of the current study

The extant empirical literature indicates that:

1. Work ability is related to worker health and operational effectiveness.
2. The Big Five personality traits are related to worker health and operational effectiveness.
3. Core self-evaluation is related to worker health and operational effectiveness.
4. Core self-evaluation appears to make a unique contribution to explaining worker health and operational effectiveness separate to that accounted for by the Big Five personality traits and that, by extension, organisational studies should include measures of both these perspectives on personality in order to better capture the broad construct.

To date, no studies have combined this disparate knowledge to examine the contribution of work ability to worker health and operational effectiveness outcomes and the incremental variance in these outcomes explained by the Big Five and core self-evaluation perspectives on personality. In response, in the context of four manufacturing organisations in

the UK the primary aim of the current study is to explore the extent to which work ability accounts for variance in a host of individual health indices (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence). A secondary aim is to examine the extent to which Big Five and core self-evaluation personality dimensions might incrementally account for additional variance in these indices over and above that accounted for by work ability. Should significant relations be identified, a rationale would emerge for (i) the use of these constructs for the early identification of individuals that might be at risk of impaired health and operational effectiveness, and (ii) an examination of the potential for the modification of these constructs as a means by which to enhance workforce health and operational effectiveness.

Hypothesis 1: Work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in psychological distress experienced by UK manufacturing employees.

Hypothesis 2: Work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in job stress experienced by UK manufacturing employees.

Hypothesis 3: Work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in job satisfaction experienced by UK manufacturing employees.

Hypothesis 4: Work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in work engagement experienced by UK manufacturing employees.

Hypothesis 5: Work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in sickness absence experienced by UK manufacturing employees.

The remainder of the current chapter has been organised into three sections. The first section focuses on the method used to collect the data and includes a detailed description of data collection procedures, participants, and study measures. The second section presents the results of the analyses. The third section presents a discussion of the results and points to ways forward for research and practice.

3.4 Method

3.4.1 Methodological approach

The quantitative survey is the most commonly applied form of design in occupational health psychology research (Spector & Pindek, 2015). Bowling (2005) suggests “quantitative research is appropriate in situations where there is pre-existing knowledge about the phenomenon of interest which permits the use of standardised methods of data collection, such as the survey” (p. 190). Such was the case for the current study that set out to measure respondents’ work ability and personality in relation to a host of individual health and operational effectiveness indices, each of which has been extensively assessed using validated measurement instruments, but never previously together in order to examine the pattern of relations that were of interest in the this study, i.e., the extent to which work ability and personality accounted for variance in the individual and operational effectiveness constructs of interest within the UK manufacturing context. Moreover, the psychological and work constructs under investigation lend themselves to measurement involving the views of workers themselves. As Taris, de Lange, and Kompier (2010) noted, “if researchers are interested in how workers perceive their work situation or how they feel about their health there is no better source of information about these issues than the workers themselves” (p. 285). Thus, in sum the quantitative survey methodology allowed for the testing of hypotheses concerning relations between these variables and facilitated the participation of a large

number of workers in a systematic fashion, thereby enhancing the external validity of the findings.

While a qualitative design could have been applied, this would have prevented generalisation of the findings beyond the sample and numerical quantification of the strength of relations between the variables under investigation. Moreover, qualitative studies can be time-consuming for participants and can involve considerable time away from daily work activities, potentially generating reluctance on the part of employers to permit the participation of their employees.

3.4.2 Background to the study

Data collection for the cross-sectional and longitudinal quantitative studies (Studies 2 and 3) took place in four manufacturing organisations in the United Kingdom. Two of the organisations were large food manufacturers based in Scotland and England, one was an electronics manufacturer based in Nottinghamshire, and one distributed engineered parts to the aircraft industry and was based in West Yorkshire. According to the European Commission (2005), the definition of a large organisation is the employment of more than 250 employees and a medium organisation up to the employment of 250 employees. On the basis of this definition, the two food manufacturing organisations were as defined as large and the latter two medium sized.

The organisations were identified and approached via the researcher's personal contacts in management and the human resource (HR) functions. In all four organisations, the HR function was the gatekeeper and provided access to employees and communicated the study to appropriate health and safety groups and committees to enhance engagement. All four organisations, via the HR functions, requested access to the questionnaire prior to it being sent to employees to review the content. Additionally, in two of the larger organisations, the OH nurse/s were asked to review the questionnaire for applicability to the

employees in terms of language and survey design. No comments or requests were received to amend the design of the questionnaire from any reviewing party.

3.4.3 Ethical considerations

The professional organisation governing psychology within the UK is The British Psychological Society (BPS). The BPS document: 'Code of Ethics and Conduct' (BPS, 2009) was therefore used to provide guidance for the researcher. As the research was conducted from a university base, the ethical procedures of the university were also considered. This involved obtaining ethical approval from the research ethics committee of the Institute of Work, Health and Organisations at the University of Nottingham. The following was considered in the application:

Consent. Informed consent involves the researcher providing participants with sufficient information about the research to enable them to decide if they wish to take part, without any coercion. The participant then enters into a contract with the researcher. In this study the aims were explained to each participant, on the first page of the questionnaire, and that they would be sent a further questionnaire in two years' time. Consent was considered to have been given by the act of completing and returning the questionnaire which is supported by the BPS (2009) for anonymised at the source, non-sensitive data. There were no incentives offered for participation and it was clearly communicated that participation was voluntary and that they could withdraw from the study at any time.

Confidentiality. In accordance with BPS (2009) guidance, assurance was provided on anonymity, but also an explanation that the results of the study may form the basis of a future academic article and an anonymised summary of the results provided to their organisation. The researcher is registered with the Information Commissioners Office so is familiar with the requirements of the Data Protection Act 1998, but all participants were informed that all data would be stored in accordance with the Data Protection Act 1998 and only available to

the researcher and research supervisor. As a further longitudinal study was planned, participants were asked the following ‘What is your date of birth? (This will be kept strictly confidential and will only be used as an identifier to match the next questionnaire in two years’ time), the researcher had no information about the participants so could not match the date of birth with names.

Protection. All participants were advised to contact their GP if they felt distressed by participating in the research study. Contact details were also provided of the researcher and research supervisor and, in accordance with the BPS (2009) guidance on debriefing, the opportunity to obtain a summary of the overall results of the study was offered.

3.4.4 Data collection procedures

Data was collected using a paper-based self-report questionnaire and an identical electronic questionnaire that was hosted on a commercial survey platform (Survey Monkey). A subscription was purchased by the author specifically for the studies reported in this thesis; further information on data security considerations is detailed in Chapter 2, section 2.4.2. The preferred method of communication within the four organisations dictated the method used. The two largest organisations used the paper-based self-report questionnaire and sent it to employees via their internal mail system; this reflected a high prevalence of manual workers without the internet or e-mail access while at work. One organisation used the online questionnaire and sent it via the internal e-mail system. The remaining organisation used a mixture of online and paper-based methods via their internal communication systems. All employees in the four organisations were briefed about the study in their prospective team meetings and via health and safety committees. The questionnaire was accompanied by a cover letter from the researcher explaining the objectives of the study, procedures for confidentiality and secure storage of the data. Employees were invited to take part in the

survey on a voluntary basis and informed that their individual responses would not be made available to their employer, with only a summary of results provided.

Procedures to protect confidentiality were as follows. The paper-based questionnaires were returned directly to the researcher in a provided stamped, self-addressed envelope. The online questionnaire was completed and the data sent directly to the online survey set up by the researcher. With both methods, the organisations were not aware of who had responded to the survey. Employee names were not requested in the survey, and questions relating to the participants' background sought only general demographic information e.g. age, gender, marital status, dependents, nationality, ethnic origin, qualifications, main job role, and length of time served with the company. Only aggregated data was analysed, and individual participants could not be identified in any reports or publications resulting from the research. Respondents were requested to provide their date of birth to enable data tracking and recording of changes in their responses to the questions over time. The tracking was an important mechanism for undertaking a longitudinal analysis of the data (chapter 4), and the following explanation at the end of the questionnaire 'This will be kept strictly confidential and will only be used as an identifier to match the next questionnaire in two years' time' was provided. The organisations did not have access to completed surveys, thereby eliminating any risk of the identification of individuals. A copy of the cover letter outlining the procedures when completing the questionnaire can be found in Appendix B.

3.4.5 Participants.

A convenience sampling technique was adopted for this study because of certain practical drivers such as easy accessibility, availability at a given time, and the willingness of the organisations to participate (Etikan, Musa, & Alkassim, 2016). Some 1,519 participants from the four organisations were invited to participate in the study. For two of the

organisations, the total workforce was sampled, while for the other data collection was restricted to two selected UK locations.

3.4.6 Measures

A number of instruments shown to be valid and reliable measures of the variables under investigation were applied. The full measures can be found in Appendix C. These measures were as follows:

Work ability. The work ability index (WAI) developed by researchers at the Institute of Occupational Health in Finland (Tuomi, Ilmarinen, Jahkola, Katajarinne, & Tulkki, 1998) was used to measure work ability. Specific reasons for the inclusion of this Finnish measure are provided below:

- The WAI was developed for use by occupational health services as part of an overall strategy to measure conditions for remaining at work as well as the risks of withdrawal from work prematurely because of a decline in work ability (Rautio & Michelsen, 2014).
- The WAI has been designed to be used between many occupational health groups (Eskelinen, Kohvakka, Merisalo, Hurri, & Wagar, 1991). The validity and reliability of the tool has been tested (De Zwart, Frings-Dresen, & van Duivenbooden, 2002; Martinez, Latorre, & Fischer, 2009) and considered acceptable for use at individual and population level and occupational health research and practice.
- The WAI is recognised internationally and has consequently been used in a number of different countries and is available in multiple languages (Lehtinen & Rantanen, 2012; van den Berg, Elders, Zwart, & Burdorf, 2009).
- The empirical evidence on the use of the WAI is extensive because of its wide application to OH practice and research over the past 30 years (Ilmarinen, 2011). More recently, the concept of WA has progressed to an interest in psychosocial

aspects such as work engagement and employee attitudes (Ilmarinen, 2013; Uronen et al., 2017) which is applicable to current biopsychosocial occupational health practice.

- Although it is not widely used in the UK, there is interest in relation to the ageing workforce (Crawford, 2016; FOM, 2004) and key clinical outcomes in UK occupational health practice (Harrison, 2016).

The WAI instrument consists of seven dimensions, namely: i) current work ability compared with the lifetime best, ii) work ability in relation to the demands of the job, iii) number of current diseases diagnosed by a physician, iv) estimated work impairment because of disease, v) sick leave during the past year (12 months), vi) own prognosis of work ability two years from now, and vii) mental resources. The responses to each question were calculated using a key and the scores categorised according to the reference values developed by Tuomi et al. (1998). These range from 7-49 and are classified as follows: 7-27 (poor), 28-36 (moderate), 37-43 (good) and 44-49 (excellent). There are three versions of the WAI: Long, short, and single item. The long version has 51 disease list items, the short version has 14 disease list items and the single item has one question asking for 'current work ability in relation to lifetime best'. The use of the short WAI version has been demonstrated to yield very similar results to the long WAI version (Nübling et al., 2004) and as other measures were also being used, it was advantageous to use the shorter version to prevent the questionnaire from becoming too long. Systematic reviews of response rates achieved in health-focused studies have consistently demonstrated an inverse relationship between questionnaire length and response rate (Edwards, et al., 2002; Edwards et al., 2004), further lending support for the decision to apply the short 14 disease item version of the questionnaire.

Core self-evaluation. Core Self-Evaluation (CSE) was chosen because it is featured in an emerging body of research on personality traits and organisational outcomes (Brunborg, 2008; Galvin & Smith, 2015; Judge & Bono, 2001; Judge et al., 2003; Judge & Kammeyer-Mueller, 2011; Lemelle & Scielzo, 2012). It is a multidimensional construct composed of a combination of four primary personality traits; self-esteem, generalised self-efficacy, neuroticism, and locus of control. It is measured using 12 items, sample items include 'I am confident I get the success I deserve in life' and 'Sometimes when I fail I feel worthless'. Responses were recorded on a five point Likert scale ranging from 'Disagree strongly' to 'Agree strongly'. Six items were reversed coded. Participants were categorised as having either a high or low CSE score based on their composite score, the mean score was used as a dividing point between high and low as recommended by Judge et al. (2003). Robust psychometric properties have been reported for the scale (Judge et al., 2003) including an average internal reliability of .84 and test-retest reliability of .81. The internal consistency in this study, measured using Cronbach alpha coefficients, was .84 which indicates good reliability.

Big Five. A number of self-report measures of the Big Five personality traits are available. Most of these involve dozens, and some hundreds, of items. To prevent the questionnaire becoming too lengthy, and the possible negative implications for the response rate, for the purposes of this study a short 10 item version with good psychometric properties was chosen (Gosling, Rentfrow, & Swann, 2003; Rammstedt & John, 2007). Each dimension is measured by two items but as recommended by Rammstedt & John (2007) a third item was included in the Agreeableness dimension to increase validity. Consequently, the full measure comprised 11 items. Responses were recorded on a five point Likert scale ranging from 'Disagree strongly' to 'Agree strongly'. Five items were reversed coded. The mean score was used as a dividing point between the high and low of each trait as recommended by previous

research (Kovaleva, Beierlein, Kemper & Rammstedt, 2013; Naseer, Khan, & Khawaja, 2012).

Work engagement. Work engagement was measured using the short version of the Utrecht Work Engagement Scale (UWES-9), developed by Schaufeli and Bakker (2004). There is a long version of the UWES consisting of 17 items, but as the internal consistency of the scores of the 9 item version has been demonstrated to be high in national samples (Schaufeli, Bakker, & Salanova, 2006) and relatively time-invariant (Seppälä et al., 2009) the short 9 item measure was used in this study. The instrument has three sub scales: Vigour, dedication, and absorption. Sample items include vigour: ‘At my work, I feel bursting with energy’. Dedication: ‘My job inspires me’. Absorption: ‘I am immersed in my work’. The items were rated on a seven point frequency-based scale ranging from never (0) to always (6) and the total UWES-9 score was used as the overall measure of work engagement, where lower scores indicated low job engagement and higher scores indicated high job engagement. Using a combined one dimensional variable, rather than a three dimensional construct, has been demonstrated to be reliable and valid with standardised stability coefficients varying between 0.82 and 0.86 (Seppälä et al., 2009). The overall Cronbach alpha coefficient for the one dimensional variable of 9 items in this study was .94 which indicates high internal consistency.

Job satisfaction. Measures of job satisfaction tend to fall into two broad types: Single item global measures and composite measures of satisfaction with various job components. Previous research has suggested that the best global rating of job satisfaction is a single item measuring overall satisfaction, as some questions on a multiple item scale may not be important to an employee’s overall satisfaction levels, which could then lead to misleading conclusions about the result (Wanous, Reichers, & Hudy, 1997). There is also empirical evidence that the single item facet measure is significantly correlated with a much longer

multiple item measure of facet satisfaction (Nagy, 2002; Wanous et al., 1997). Consequently, job satisfaction was measured using a single item five point Likert scale which asked 'Overall, how satisfied are you with your job'. Responses were recorded ranging from 'not satisfied' (1) to 'very satisfied' (5). The lower score indicated low job satisfaction and the higher score high job satisfaction.

Work-related stress. Job stress has been measured in previous studies via a single item question 'How stressful do you find your job? Responses were given on a five point Likert scale, from not at all stressful (1) to extremely stressful (5). The lower score indicated low job stress and the higher score indicated high job stress (Houdmont, Kerr, & Addley, 2012; Packham, Webster, & Branch 2009).

In previous research, the single item measure of stress has proved to be a valid measure for use in organisational studies (Elo, Leppänen, & Jahkola, 2003). In the context of work-related stress, it can be argued that the single item measure has an advantage over most multi-item psychosocial work environment measures by virtue of not being structured around predetermined domains. For example, in the context of research on work-related stress, much is known about the influence on the health of certain aspects of the psychosocial work environment such as job demands, control, and support (Houdmont, Randall, Kerr, & Addley, 2013). However, some occupations will have their own unique psychosocial hazards that might have a strong influence on health while not being included in existing psychosocial work environment measures. It is, therefore, possible that for a construct such as work-related stress, a single item measure might provide a more accurate assessment compared to a multi-item scale, thereby increasing construct validity and consequently permitting the respondent to consider personally salient features of the situation. Indeed, the theoretical models that have dominated the study of work-related stress, namely the Demand-Control (Karasek, 1979) and Effort-Reward Imbalance (Siegrist, 1996) perspectives, have been criticised for

being focused on an excessively restricted set of environmental variables. This has called into question “whether the DCM and ERI-model are applicable to the universe of job positions, and whether in certain occupations other combinations of demands and (lack of) resources than the ones incorporated in the models may be responsible for employee wellbeing” (Bakker & Demerouti, 2007).

Previous research has reviewed UK nationally representative workforce surveys conducted between 1995 and 2008 and found that the seven surveys involving a single item measure of work-related stress consistently produced a prevalence rate of between 12.0% and 18.5% (Houdmont, Cox, & Griffiths, 2010). Notably, in the same review the degree of reliability demonstrated by the single item approach to the measurement of stress as a risk to health was superior to that found for measures that conceptualised stress as a health outcome. Such measures typically require respondents to choose from a list of ailments (which include stress) that they have experienced which are perceived to be caused or made worse by work. Taking into account the arguments for and against a single and multi-item approach, the single item question was therefore included in this study.

Psychological distress (anxiety and depression). This was measured using a screening tool, the 12 item version of the General Health Questionnaire (GHQ-12) (Goldberg & Williams, 1988). This comprises 12 items describing mood states, six of which are positively phrased and six negatively phrased. Sample items include ‘Have you recently been able to concentrate on whatever you are doing?’ and ‘Have you been feeling reasonably happy, all things considered?’ Responses were recorded on a four point scale. Each item on the scale has four responses ranging from better than usual, same as usual, less than usual, and much less than usual. For the purpose of this study, the GHQ scoring method (0-0-1-1) was chosen over the simple Likert scale of 0-1-2-3, as this scoring method has been found to be more reliable than the alternative Likert scoring method because of a lack of response bias which

might result from the respondents who tend to choose responses 1 and 4 or 2 and 3, respectively (Goldberg et al., 1997; Hankins, 2008). The total possible score for the GHQ-12 ranges from 0-12. Reliability coefficients have been demonstrated in previous studies as satisfactory (Goldberg et al., 1997, Zulkefley & Baharudin, 2010). In this study the scale reliability for the GHQ-12 was measured using Cronbach alpha and found to be .90 indicating high internal consistency.

Sickness absence. Health is naturally associated with sickness absence, and global health measures such as self-reported health have been demonstrated to predict sickness absence in previous studies (Marmot, Feeney, Shipley, North, & Syme, 1995). Sickness absence, in this study, was measured using a self-reported single item ‘How many spells of absence have you taken off work due to ill health, in the past 12 months’? Spells of absence rather than days of absence was measured for two reasons: Firstly, days of absence was already measured as part of the WAI and secondly previous research has demonstrated that the frequency of sickness absence is better predicted by the history of sickness absence than the duration in terms of days of sickness absence (Roelen, Koopmans, Schreuder, Anema, & Van der Beek, 2011). Responses from the single item five point Likert scale were calculated for all participants ranging from ‘none’ (1) to ‘above 5 spells’ (5). The mean score was used as a dividing point between low and high sickness absence. Low sickness absence was identified between 0-1 (none, 1 spell), and higher absence as above the score of 2 spells (2-3 spells, 4-5 spells, above 5 spells).

Socio-demographic and occupational variables. Data was collected on a set of socio-demographic variables – age, gender, marital status, the number of dependents, nationality, ethnic origin, geographical area, and qualifications. In addition, two occupational variables were assessed: Primary job role and length of time working with the company.

3.4.7 Analytical approach

The current study applied bivariate correlations in addition to linear regression analysis to examine relationships among the variables under investigation.

Linear regression analysis was used as it allows for the examination of the extent to which the predictor variables (work ability, Big Five, CSE) account for variance in the criterion variables (psychological distress, job stress, job satisfaction, work engagement, and sickness absence) after controlling for the effects of occupational and demographic variables. In addition, linear regression permitted examination of additional incremental variance in the outcome variables accounted for by each of the personality constructs over and above that accounted for by work ability. At an organisational level this information would provide a prioritised rationale for the possible modification of the WA construct and/or the use of additional psychosocial measures as a means in which to enhance workforce health, wellbeing, and operational effectiveness. Additionally, the contribution of the Big Five and CSE to the dependent variables over and above that accounted for by work ability could facilitate early identification of individuals that may be at risk of impaired health because of deficiency of personal resources.

This section describes the scoring and calculation of each instrument used to prepare the data for analysis. It also describes the assumption testing undertaken prior to running the regressions, as well as the step-by-step procedures used when conducting the regressions themselves.

Work ability index. The responses to each question were calculated using a key (Tuomi et al., 1998) and then calculated by summing the points received for each item. The score for item two ‘Work ability in relation to the demands of the job’ is weighted differently depending on whether the work is primarily physical or mental so job roles were taken into account with this question. The total score for the seven items was compared to the reference

values presented in Tuomi et al. (1998) which ranged from 7-49 and are classified as follows: 7-27 (poor), 28-36 (moderate), 37-43 (good) and 44-49 (excellent).

Utrecht Work Engagement Scale (UWES-9). Each of the nine questions was calculated using a seven point frequency based scale ranging from never (0) to always (6). The total UWES-9 sum score was used as the overall measurement of work engagement.

Job satisfaction. Responses from the single item five point Likert scale were calculated for all participants ranging from 'not satisfied' (1) to 'very satisfied' (5).

Work-related stress. Responses from the single item five point Likert scale were calculated for all participants ranging from 'not at all stressful' (1) to 'extremely stressful' (5).

General Health Questionnaire (GHQ-12). The 12 items were coded according to the GHQ method 0-0-1-1 approach. A sum score was calculated for all participants by adding all the items on the scale from 0 – 12.

Core self-evaluation. Six of the 12 questions were reverse scored and responses from all participants were summed on a five point Likert scale. The total score was calculated out of a maximum possible of 60.

Big Five. Five of the 11 questions were reverse scored and responses summed. Each dimension was scored separately with the maximum possible of 10 with the exception of Agreeableness which was 15 because of the inclusion of a third item of the dimension.

Descriptive statistics. Measures of central tendency (mean), dispersion (standard deviation), correlations, and alpha reliability coefficients were calculated for all the variables under investigation.

Regression analyses

Five linear regression analyses were conducted, one for each dependent (outcome) variable. The covariates (age and gender) were entered into the first step to control for their

possible influence on the dependent variables (Model 1). Work ability was entered into the second step to assess its direct effect on the dependent variables (Model 2). The Big Five traits were entered in the third step (Model 3) and CSE entered in the fourth step (Model 4) to assess the extent to which they accounted for variance in the dependent variables over and above that accounted for by work ability.

3.5 Results

The following section presents the results of the cross-sectional analyses. These results were derived from bivariate correlation and linear regression analyses conducted using SPSS version 20 (IBM Corp).

3.5.1 Data available for analysis

The surveys were administered in June 2012 and completed surveys received from 333 manufacturing employees. Sixty percent of the respondents were based in the north of England, 17% were based in the Midlands, 12% were in the south of England, and 11% in Scotland. Outliers were identified using a box and whiskers plot created by SPSS which identified unusually high or low scores. From the original cohort of 333 participants, 22 were excluded because of the identification of outliers and missing data of the key variables studied. This left 311 cases (131 female and 180 male) available for analysis.

3.5.2 Response rate

The total of 333 respondents represented a response rate of 21%. This is a low response, but prior research suggests that response rates of organisational studies usually range between 16.9% and 54.5% (Baruch & Holtom, 2008), suggesting that although the response rate achieved in the current study is low, it is nevertheless not atypical of that achieved in organisational research. Moreover, organisation-wide occupational health studies such as this typically achieve a one-in-five response rate (e.g. Houdmont, Kerr, & Randall, 2012). Moreover, a content analysis of two leading work and occupational health psychology

journals revealed a median sample size of 299 (Spector & Pindek, 2015). To increase the response rate, one reminder was sent via e-mail to employees who received the online questionnaire and verbally via team meetings to those who received it as a paper-based copy. The reminders were sent via the organisational administrators. Potential non-response bias was tested by comparing early and late responders; the first 50 responses were compared with the final 50 responses received after the reminder as per Kerr, McHugh, & McCrory (2009). Table 3.1 presents means, standard deviations, and *t*-test results against each of the measures under investigation with the exception of gender where, because of dichotomisation of the gender variable, a Chi-square test was used instead as recommended by Morgan, Leech, Gloeckner, and Barrett, (2013). The results indicated that there was no significant difference between the early and late responders apart from the Big Five measure (openness) and job satisfaction variables. Overall these findings suggest an absence of non-response bias.

Table 3.1

Study 2 Comparison of Early and Late Responders

Measure	First 50 responses Mean (SD)	Last 50 responses Mean (SD)	<i>t</i>	X^2
Age	41.48	40.69	0.4	
Gender	-	-		.243
Work ability	41.1 (5.6)	42.1 (5.7)	- 0.8	
CSE	43.4 (8.1)	44.6 (8.6)	- 0.7	
Big Five – Extraversion	5.6 (1.7)	6.2 (1.9)	-1.7	
Big Five – Neuroticism	5.4 (1.1)	5.2 (5.2)	0.5	
Big Five – Conscientiousness	8.7 (1.3)	8.7 (1.5)	-0.1	
Big Five – Openness	7.3 (1.7)	6.6 (1.4)	2.17*	
Big Five - Agreeableness	12.7 (1.6)	12.4 (1.6)	0.8	
Psychological distress	2.8 (3.6)	2.1 (2.7)	1.1	
Job Satisfaction	3.9 (0.9)	3.3 (1.1)	3.0*	
Job Stress	2.4 (0.9)	2.8 (0.9)	-1.8	
Work engagement	35.6 (8.7)	33.4 (10.8)	1.1	
Absence	1.7 (0.7)	1.7 (0.8)	0.1	

**p* < .05

3.5.3 Sample size calculation

G*Power (Faul et al., 2009) was used to determine the sample size required for the study. For linear multiple regression a minimum sample size of 114 cases was required with alpha set at the 5% level ($\alpha = .05$), power at .8 ($\pi = 0.80$), a minimum effect size of moderate strength ($f^2 = .15$) (Cohen, 1988), and nine predictor variables (age, gender, Big Five personality variables, work ability, core self-evaluation).

3.5.4 Online versus paper surveys

Data was collected using a paper-based self-report questionnaire and an identical commercial online self-report questionnaire (Survey Monkey). The preferred communication method of the organisation dictated whether the employees were sent a paper-based or online questionnaire; a key consideration was whether the employees had access to the internet in work time and an occupational e-mail address. There is empirical evidence of equivalence between paper-based and internet data collection methods (De Beuckalaer & Lievens, 2009; Kaplowitz, Hadlock, & Levine, 2004; Vallejo, Jordan, Diaz, Comeche, & Ortega, 2007; Weigold, Weigold, & Russell, 2013). In this study 33% ($n = 103$) of respondents used the online method and 67% ($n = 208$) respondents used the paper method.

3.5.5 Generalisability

The manufacturing industry employs around 2.6 million people in the UK and is the third largest sector in the UK economy, representing just over 11% of the UK economy (Rhodes, 2014). The extent to which the findings from this study can be demonstrated to represent the general population of manufacturing employees in the UK is difficult to establish, as there is no standard, readily obtainable data on which to compare the population, particularly with regard to demographic characteristics such as age and gender. A review of academic literature and policy documents identified a lack of evidence with regard to manufacturing social scientific research and thus comparable papers. Contacting specific

organisations who represent the manufacturing industry was also unsuccessful in obtaining such data; it appears that data collected on the manufacturing sector tends to focus on economic productivity rather than employee/demographic characteristics (J. McQuillan, Personal communication, November 19, 2014; T. Jeavons, Personal communication, November 19, 2014).

3.5.6 Descriptive statistics

The descriptive statistics, correlations, and reliability coefficients of the variables in the study are shown in Table 3.2. Work ability, core self-evaluation, psychological distress, and job engagement had good to excellent internal consistency, with Cronbach alpha coefficients ranging from .72 to .93. The Big Five dimensions of extraversion, neuroticism, conscientiousness, openness, and agreeableness had low internal consistency with no Cronbach alpha scoring coefficients above .47. Such is to be expected given that only two items measured each dimension. Job satisfaction, job stress, and sickness absence were single items so it was not possible to measure internal consistency because of the narrow range of the question. A measure of central tendency (mean) and a measure of dispersion (standard deviation) was also calculated for all variables except gender.

The correlation coefficients presented in Table 3.2 show a large number of significant relationships between the study variables. Most of the associations were small to moderate in strength; that is, the Pearson correlation coefficient (r) fell between .10 and .49 (Cohen, 1988). Four of the associations, job satisfaction, and work engagement ($r = .63$), psychological distress and core self-evaluation ($r = .52$), core self-evaluation and neuroticism ($r = -.56$) and openness and extraversion ($r = -.62$) demonstrated a large effect (Cohen, 1988). None of the study variables had an extremely high correlation value, indicating that multicollinearity was unlikely to cause statistical problems in formulating a model in the subsequent regression analyses. Correlations between work ability and organisational

outcome variables, such as job satisfaction and work engagement, were moderate strength and positive valence. There was a negative moderate association between work ability and other individual and organisational outcomes such as job stress and absence. Work ability had a negative moderate association with the individual variable of psychological distress and the Big Five dimension of neuroticism and was weakly associated with age and gender. The relationship between work ability and core self-evaluation was of moderate strength and positive valence.

Core self-evaluation showed the strongest relationship with work ability and work engagement ($r = .45$), the weakest effect was the correlation with absence ($r = .23$). It had a negative large relationship with psychological distress ($r = -.52$) and the Big Five dimension of neuroticism. There was a more moderate relationship with the individual health outcome variable of job stress.

Table 3.2

Cross-Sectional Descriptive Statistics, Scale Reliabilities, and Correlations between Variables (n = 311)

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	41.88	10.73	-													
2. Gender	-	-	-	.18**												
3. Work ability	42.84	5.13	.72	-.02	.01											
4. Core self-evaluation	43.99	8.09	.83	.13*	.10	.49**										
5. Extraversion	6.04	1.92	.47	-.05	-.14*	-.01	.07									
6. Neuroticism	5.27	1.94	.47	-.16**	-.08	-.31**	-.56**	-.12*								
7. Conscientiousness	8.73	1.50	.45	.21**	-.10	.20**	.30**	-.05	-.22**							
8. Openness	7.01	1.59	.02	.03	.07	.02	-.06	-.62**	-.04	.06						
9. Agreeableness	12.22	1.80	.45	.07	-.17**	.25**	.29**	-.01	-.24**	.37**	-.01					
10. Psychological distress	2.07	2.99	.90	-.11	-.06	-.49**	-.52**	.05	.34**	-.16**	-.05	-.13*				
11. Job satisfaction	3.6	1.08	-	.01	-.15*	.32**	.37**	.08	-.18**	.16**	-.04	.21**	-.24**			
12. Job stress	2.60	.90	-	.04	.05	-.34**	-.37**	-.07	.26**	-.17**	.02	-.19**	.27**	-.27**		
13. Work engagement	35.57	10.19	.93	.19**	-.04	.42**	.45**	.02	-.36**	.32**	.05	.33**	-.32**	.63**	-.22**	
14. Absence	1.64	.79	-	-.13*	-.25**	-.39**	.23**	.01	.22**	-.03	.03	-.05	.34**	-.17**	.12*	-.27**

* $p < .05$; ** $p < .01$

3.5.7 Inferential analyses

The bivariate correlations lend support for the relevance of work ability and the personality constructs to a host of individual health and organisational effectiveness indices. However, they do not clarify the extent to which the hypotheses are supported, i.e. the Big Five personality traits and CSE will account for variance in the individual health and organisational effectiveness dependent variables over and above that accounted for by work ability. Hierarchical linear regression was therefore undertaken to respond to the study hypotheses. The results of the cross-sectional hierarchical linear regressions are reported in Tables 3.3 - 3.7.

The results of the regression analysis with psychological distress as the dependent variable are shown in Table 3.3. The covariates (age, gender) explained 1% of the variance in psychological distress (Model 1), with only age significantly contributing to the model (R^2 adj. = 0.01). Model 1 was not statistically significant. The addition of work ability (Model 2) explained 24% extra variance as compared to model 1 (R^2 adj. = 0.25) and was statistically significant ($p < .001$). The addition of the Big Five personality traits explained 3% extra variance as compared to model 2, with only neuroticism significantly contributing to the model (R^2 adj. = 0.28). The change between Model 2 and Model 3 was statistically significant ($p < .01$). The addition of core self-evaluation (Model 4) resulted in the explanation of a further 8% of the variance as compared to Model 3 (R^2 adj. = 0.28) and was statistically significant ($p < .001$). Thus, the vast majority of explained variance in psychological distress was accounted for by work ability, though a notable additional portion of the variance over and above that explained by work ability was accounted for by the personality constructs, particularly CSE. Hypothesis 1, namely that work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in

psychological distress experienced by UK manufacturing employees was therefore fully supported.

Table 3.3

Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Explaining Psychological Distress (n = 311)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Model 1												
Age	-.04	.02	-.13*	-.04	.02	-.14***	-.03	.02	-.11*	-.03	.01	-.10
Gender	.14	.32	.03	.14	.28	.03	.39	.29	.07	.41	.27	.08
Model 2												
Work Ability				-.29	.03	-.50***	-.26	.03	-.44***	-.19	.03	-.33***
Model 3												
Extraversion							.19	.11	.12	.23	.10	.15*
Neuroticism							.35	.09	.23***	.11	.09	.07
Conscientiousness							-.00	.11	-.00	.08	.11	.04
Openness							.09	.12	.05	.14	.12	.08
Agreeableness							.09	.10	.06	.12	.09	.07
Model 4												
Core Self-Evaluation										-.13	.02	-.36***
R ²	.02			.26			.30			.38		
R ² adj.	.01			.25			.28			.36		
F for change 2.34 in R ²				93.70***			3.33**			31.61***		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; *SE B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; *R*², explained variance; adj. *R*², adjusted explained variance.

The results of the regression analysis with job stress as the dependent variable are shown in Table 3.4. The covariates (age, gender) explained no variance in job stress (Model 1). The addition of work ability (Model 2) explained 11% extra variance as compared to model 1 (R^2 adj. = 0.00) and was statistically significant ($p < .001$). The addition of the Big Five personality traits explained 3% extra variance as compared to model 2 (R^2 adj. = 0.11). The addition of core self-evaluation (Model 4) explained 3% extra variance as compared to Model 3 (R^2 adj. = 0.14) and was significantly significant ($p < .001$). The change between Model 2 and Model 3 was statistically significant ($p < .01$) Thus, the vast majority of explained variance in job stress was accounted for by work ability, though a notable

additional portion of the variance over and above that explained by work ability was explained by the personality constructs. Hypothesis 2, namely that work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in job stress experienced by UK manufacturing employees was therefore fully supported.

Table 3.4

Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Explaining Job Stress (n = 311)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	.00	.01	.03	.00	.01	.03	.01	.01	.07	.01	.01	.08
Gender	.13	.10	.08	.13	.09	.08	.12	.09	.07	.13	.09	.08
Model 2												
Work Ability				-.06	.01	-.33***	-.05	.01	-.26***	-.03	.01	-.18**
Model 3												
Extraversion							-.01	.03	-.03	-.00*	.03*	-.01
Neuroticism							.08	.03	.16**	.03	.03	.06
Conscientiousness							-.04	.04	-.06	-.02	.04	-.03
Openness							.01	.04	.01	.02	.04	.03
Agreeableness							-.03	.03	-.06	-.03	.03	-.05
Model 4												
Core Self-Evaluation										-.03	.01	-.24***
R ²	.01			.12			.16			.19		
R ² adj.	.00			.11			.14			.17		
F for change in R ²	1.15			37.08***			2.72**			11.19***		

*p<.05, **p<.01, ***p<.001.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; adj. R², adjusted explained variance.

The results of the regression analysis with job satisfaction as the dependent variable are shown in Table 3.5. The covariates (age, gender) explained 2% of the variance in job satisfaction (Model 1), with only gender significantly contributing to the model (R^2 adj. = 0.02). Model 1 was statistically significant. The addition of work ability (Model 2) explained 10% extra variance as compared to model 1 (R^2 adj. = 0.02) and was statistically significant ($p < .001$). The addition of the Big Five personality traits explained 1% extra variance as

compared to model 2 (R^2 adj. = 0.12). The change between Model 2 and Model 3 was not statistically significant. The addition of core self-evaluation (Model 4) resulted in the explanation of a further 5% of the variance as compared to Model 3 (R^2 adj. = 0.13) and was statistically significant ($p < .001$). Thus, the vast majority of explained variance in job satisfaction was accounted for by work ability, though a notable additional portion of the variance over and above that explained by work ability was explained by the CSE personality construct. Hypothesis 3, namely that work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in job satisfaction experienced by UK manufacturing employees was therefore partially supported.

Table 3.5

Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Explaining Job Satisfaction (n = 311)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	.00	.01	.04	.00	.01	.04	.00	.01	.01	.00	.01	.00
Gender	-.32	.11	-.16**	-.32	.11	-.16**	-.26	.11	-.13*	-.27	.11	-.14*
Model 2												
Work Ability				-.07	.01	-.31***	.06	.01	.26***	.04	.01	.16**
Model 3												
Extraversion							.04	.04	.06	.02	.04	.04
Neuroticism							-.04	.03	-.06	.04	.04	.06
Conscientiousness							.05	.04	.07	.02	.04	.03
Openness							.00	.05	.00	-.01	.05	-.02
Agreeableness							.06	.04	.11	.05	.04	.09
Model 4												
Core Self-Evaluation										.04	.01	-.31***
R^2	.03			.13			.15			.21		
R^2 adj.	.02			.12			.13			.18		
F for change in R^2	3.89*			32.90***			1.94			18.78***		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; adj. R^2 , adjusted explained variance.

The results of the regression analysis with work engagement as the dependent variable are shown in Table 3.6. The covariates (age, gender) explained 4% of the variance in work engagement (Model 1), with only age significantly contributing to the model (R^2 adj. = 0.04). Model 1 was statistically significant. The addition of work ability (Model 2) explained 19% extra variance as compared to model 1 (R^2 adj. = 0.04) and was statistically significant ($p < .001$). The addition of the Big Five personality traits explained 8% extra variance as compared to model 2, with neuroticism, conscientiousness and agreeableness significantly contributing to the model (R^2 adj. = 0.23). The change between Model 2 and Model 3 was statistically significant ($p < .001$). The addition of core self-evaluation (Model 4) resulted in the explanation of a further 2% of the variance as compared to Model 3 (R^2 adj. = 0.31) and was statistically significant ($p < .01$). Thus, the vast majority of explained variance in work engagement was accounted for by work ability, though a notable additional portion of the variance over and above that explained by work ability was explained by the personality constructs.

Hypothesis 4, namely that work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in work engagement experienced by UK manufacturing employees, was therefore fully supported.

Table 3.6

Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Explaining Work Engagement (n = 311)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	.20	.06	.21***	.20	.05	.21***	.13	.05	.14**	.13	.05	.13**
Gender	-2.00	1.05	-.11	-2.02	.94	-.11*	-1.49	.93	-.08	-1.58	.92	-.09
Model 2												
Work Ability				.86	.10	.43***	.61	.11	.31***	.50	.11	.25***
Model 3												
Extraversion							.22	.34	.04	.14	.33	.03
Neuroticism							-.92	.29	-.18**	-.55	.31	-.11
Conscientiousness							1.06	.36	.16*	.91	.36	.14*
Openness							.38	.39	.06	.30	.39	.05
Agreeableness							.77	.31	.14*	.72	.30	.13*
Model 4												
Core Self-Evaluation										.22	.08	.18**
R ²	.05			.23			.33			.35		
R ² adj.	.04			.23			.31			.33		
F for change in R ²	7.89**			69.69***			8.50***			7.60**		

*p<.05, **p<.01, ***p<.001.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; adj. R², adjusted explained variance.

The results of the regression analysis with sickness absence as the dependent variable are shown in Table 3.7. The covariates (age, gender) explained 5% of the variance in sickness absence (Model 1), with only gender significantly contributing to the model (R^2 adj. = 0.05). Model 1 was statistically significant. The addition of work ability (Model 2) explained 15% extra variance as compared to model 1 (R^2 adj. = 0.05) and was statistically significant ($p < .001$). The addition of the Big Five personality traits explained 1% extra variance as compared to model 2. (R^2 adj. = 0.20). The change between Model 2 and Model 3 was not statistically significant. The addition of core self-evaluation (Model 4) resulted in the explanation of a further -1% of the variance as compared to Model 3 (R^2 adj. = 0.21) and was not statistically significant. Thus, the vast majority of explained variance in sickness absence

was accounted for by work ability with no significant additional portion of the variance over and above that explained by work ability accounted for by the Big Five or CSE.

Hypothesis 5, namely that work ability, the Big Five personality traits, and core self-evaluation will explain a significant portion of the variance in sickness absence experienced by UK manufacturing employees was therefore partially supported.

Table 3.7

Cross-Sectional Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self-Evaluation Explaining Sickness Absence (n = 311)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	-.01	.00	.11	-.01	.00	-.11*	-.01	.00	-.11*	-.01	.00	-.11*
Gender	-.28	.08	-.19**	-.28	.08	-.19***	-.24	.08	-.17**	-.24	.08	-.17**
Model 2												
Work Ability				-.06	.01	-.39***	-.06	.01	-.39***	-.06	.01	-.38***
Model 3												
Extraversion							.02	.03	.04	.02	.03	.04
Neuroticism							.04	.02	.10	.04	.03	.10
Conscientiousness							.03	.03	.06	.04	.03	.07
Openness							.05	.03	.10	.05	.03	.10
Agreeableness							.03	.03	.06	.03	.03	.06
Model 4												
Core Self-Evaluation										-.00	.01	-.02
R ²	.06			.21			.23			.23		
R ² adj.	.05			.20			.21			.20		
F for change in R ²	8.47***			56.79***			1.41			.10		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; adj. R^2 , adjusted explained variance.

Comparative results between the Big Five and CSE were conducted and the findings indicate that CSE accounted for a greater portion of the variance for the three dependent variables concerned with workers' health and wellbeing (psychological distress, job stress, and job satisfaction) than the Big Five personality traits. For work engagement, the Big Five accounted for a larger portion of the variance than CSE. For sickness absence, neither of the

personality constructs made a significant contribution to the regression model. Table 3.8 summarises the differences in variance between CSE and the Big Five from the cross-sectional hierarchical regression analyses described in this study.

Table 3.8

Study 2 Overview of CSE and the Big Five Contribution

Dependent Variable	Covariates (age, gender)	Big Five	CSE
Psychological distress	1%	3% (neuroticism)	8%
Job stress	0%	3% (neuroticism)	3%
Job satisfaction	2%	1%	5%
Work engagement	4%	8% (neuroticism, conscientiousness, agreeableness)	2%
Sickness absence	5%	1%	-1%

3.6 Discussion

3.6.1 Summary of findings

The primary aim of this study was to explore the extent to which work ability accounts for variance in a host of individual health indices (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence). A secondary aim was to examine the extent to which two personality constructs – the Big Five personality traits and core self-evaluation – might each incrementally account for additional variance in these indices over and above that accounted for by work ability. These analyses were deemed important because, should significant relations be identified, a rationale would emerge for (i) the use of these constructs for the early identification of individuals that might be at risk of impaired health, wellbeing, and operational effectiveness, and (ii) an examination of the potential for the modification of these constructs as a means by which to enhance workforce health, wellbeing, and operational effectiveness.

Overall, the hypotheses were supported. The vast majority of variance in all of the dependent variables was explained by work ability. The Big Five personality traits provided

significant explanatory power over and above work ability for three of the dependent variables (psychological distress, job stress, work engagement) while core self-evaluation provided further significant explanatory value over and above that provided by work ability and the Big Five personality traits for four of the dependent variables (psychological distress, job stress, job satisfaction, work engagement). The personality dimensions made no significant contribution to the explanation of variance in sickness absence.

3.6.2 Findings compared to previous studies

In terms of the contribution of work ability to explaining variance in the individual health and operational effectiveness constructs, results were generally consistent with previous research. For instance, in a large-scale Swedish study, Löve et al. (2012) found that work ability successfully predicted the sick listing of employees. Guidi et al. (2012) demonstrated a 47% contribution in WAI scores by the use of the GHQ in a study of Italian bankers and Silva, Marqueze, Totenberg, Fischer, & Castro Moreno (2012) found an association between job satisfaction and reduced work ability in shift workers. Mache et al. (2015) found a positive association between personal resources and work ability which then influenced increased work engagement.

Personality as a personal resource has not been extensively researched in relation to work ability. One study did find internal locus of control as a moderator of the relationship between work ability and stress (Bethge & Radoschewski, 2010) and prior research has shown that self-efficacy expectations (Perdue, Reardon, & Peterson, 2007; Stetz et al., 2007) and general emotionality (Huelsman, Munz, & Furr, 2003) may mediate organisational outcomes such as work stress and work satisfaction. Furthermore, in a study of work ability promoting factors in nurses, Larsson, Karlqvist, Westerberg, and Gard (2012) found that perceptions of self-efficacy and musculoskeletal wellbeing contributed to work ability and

conclude that it is important to assess the influences of work satisfaction, stress, and personal resources on work ability.

The findings of this present study are consistent with previous research which has investigated core self-evaluation in relation to job satisfaction, job stress, work engagement, and psychological health (Abikoye & Sholarin, 2012; Best et al., 2005; Brunborg, 2008; Kahn & Byosiere, 1992; Kammeyer-Mueller et al., 2009; Salanova et al., 2002). Risk factors for sickness absence have been studied extensively (Labriola, Lund, & Burr, 2006) but few studies have addressed the role of personality characteristics with sickness absenteeism. Interestingly, in the current study CSE explained additional variance in each of the dependent variables with the exception of sickness absence.

The findings of this study compared with previous research are mixed in relation to the Big Five. A literature review by Therasa and Vijayabanu (2015) concluded that conscientiousness, agreeableness, extraversion and neuroticism have the most obvious connections with job satisfaction. In other studies, the trait conscientiousness has been the strongest associated with job satisfaction (Furnham et al., 2009; Judge et al., 2002) and performance (Hart & Furnham, 2016; Hertz & Donovan, 2000). High neuroticism has been found to predict physical ill health, higher stressor exposure, dysfunctional coping, physical ill health, and job dissatisfaction (Grant & Fox, 2006). There are few studies examining the association of work engagement and the Big Five (Seppälä et al., 2009), but the findings of one such study were characterised by high scores of extraversion in combination with low scores on neuroticism (Langelaan et al., 2006).

3.6.3 Implications of the current study

The association between work ability and individual and work-related factors has been extensively reviewed with the conclusion that some determinants such as health, functional capacity, and work-related risk factors are overrepresented in research and the

influence of values, attitudes, and motivation of work ability are lagging behind (Van den Berg et al., 2008). Thus, the focus of interventional studies to maintain and improve work ability have largely been focused on improving individual mental and physical health resources by the use of multiprofessional teams such as nurses, doctors, and physiotherapists (Saltychev et al., 2013), to increase physical fitness by means of exercise training (Gram, Holtermann, Bültmann, Sjøgaard, & Sjøgaard, 2012), or improving cardiovascular risk factors (Flannery, Resnick, & McMullen, 2012).

It has also been suggested that work ability research on the older worker has also been over represented (Ilmarinen, Ilmarinen, Huuhtanen, Louhevaara, & Näsman, 2015) and influenced interventions. A recent systematic review identified a lack of high-quality RCTs and therefore concluded that there was insufficient evidence for a positive effect of interventions on ageing workers' work ability (Cloostermans, Bekkers, Uiters, & Proper, 2014). However, it could be argued that an RCT design might not be the most helpful in work ability research and non-randomised study designs, such as cohort studies, the preferred option because of the ability to carry out follow up studies (Verbeek, 2013). In this present study the covariate of age did not significantly contribute to any variance which supports the view that all ages should be targeted for workplace interventions (Ilmarinen et al., 2015).

Work ability is a subjective measure based on self-perception or evaluation of the individual's ability to continue working in their job, and so it is unclear how this would be influenced by the interventions of, for example, exercise or cardiovascular risk factors as suggested in previous studies (Gram, et al., 2012, Flannery et al., 2012). When examining core self-evaluation theory, if an individual appraises their situation positively or negatively then this could have a direct effect on how they perceive their personal resources against the demands of their working environment. For example, prior research has identified that individuals with high CSE would experience more job satisfaction compared to individuals

with a low CSE (Judge & Bono, 2001). It has also been demonstrated that levels of CSE have a significant effect on job stress (Brunborg, 2008).

According to Furnham (2008, p. 121) the study of personality has been reborn in industrial, work, and organisational psychology with the emphasis on the personality and performance relationship. In terms of wellbeing in the workplace, the measurement of predictors including work characteristics and individual differences can provide an approach which identifies potential causes of positive or negative wellbeing as a basis for action (Williams & Smith, 2016). For example, this is demonstrated by Pranjic, Maleš-Bilić, Beganlic, & Mustajbegovic (2006) in a study examining work ability and the association between mobbing, work environmental factors, health outcomes, and personality. The results identified a significant association between WAI, personality, occupational factors, and adverse health outcomes. It is therefore posited that the results of this current study lend support to the understanding of the way in which personality might play a role in determining health and work outcomes alongside work ability, thus contributing to the holistic concept of work ability in relation to values, attitudes, and motivation (Figure 1.1).

As this is a cross-sectional study, it fails to investigate whether the findings may persist over time. This is particularly important for CSE as to determine whether this is a stable personality trait, longitudinal research is necessary. The empirical evidence so far, the findings in this study, and the over representation on interventions to improve work-related and health determinants, indicate a different approach to further interventional research. Interventional research to improve personal psychological resources to help maintain work ability and interventions to improve core self-evaluation to appraise in a consistently positive manner could have important implications for the preservation of individual work ability and organisational effectiveness.

3.6.4 Limitations of the current study

A methodological limitation of the present study concerns the use of self-report measures, especially considering that three of the measures (job satisfaction, sickness absence, and job stress) were a single item and therefore internal consistency could not be measured. A further limitation was the cross-sectional design that limits the ability to establish the direction of causation between variables. A longitudinal design is therefore required to establish patterns of causation between variables. The poor response rate of 21% was also a limitation, as discussed in 3.5.2. Although empirical research has found equivalence using self-report survey-based paper and pen and online data collection methods (De Beuckalaer & Lievens, 2009; Kaplowitz, et al., 2004; Weigold et al., 2013) the vast majority of the survey respondents used the pen and paper method and were reminded to complete the survey during team meetings. Further methods to encourage completion of the survey to increase the response rate could, therefore, have been explored with the survey administrators in the initial phase of the study.

Moreover, macro factors such as the negative UK economic climate could have also affected the response rate. In 2012 there was a fall of 3% in UK manufacturing productivity (Rhodes, 2014) and anecdotal evidence from each of the organisations that took part in the study indicated that this was a concern and directly affected their decisions about the future employment of workers. The possibility of a healthy worker effect having under-estimated the association between work ability and the individual and organisational outcomes cannot, therefore, be discounted. Further, it is possible that those with a higher core self-evaluation and work ability score were more inclined to respond because of feeling more secure in their workplace than those who were undergoing performance issues in relation to sickness absence and the threat of losing their job.

The study population was a convenience sample from four manufacturing organisations. However, caution should be taken in interpreting the results, as one limitation is the lack of demographic manufacturing data available and, therefore, generalisability to the wider manufacturing industry could not be established in this study. With regard to workforce generalisability the *t* test analysis on early and late responders (Table 3.1) identified a significant difference between the two groups in terms of the Big Five trait of openness and job satisfaction; all other measures were not statistically significant, suggesting there was no difference between the groups. The descriptor of the trait openness to experience includes curiosity, imagination, originality, and the value of intellectual matters (McCrae & John, 1992). Additionally, an association between openness to experience and higher job satisfaction has been found in qualified professionals (Cohrs et al., 2006) so it is possible that the early responders were intrinsically more interested in participating in new research than the late responders and equally more satisfied with their jobs although, interestingly, the participants in this study were manual workers rather than qualified professionals. If data collection had been stopped before the reminder the late responders would have potentially been non-respondents so the extent to which the results of the openness and job satisfaction measure can be applied to the workforce as a whole therefore needs to be interpreted with caution.

The participants were informed in the study introductory sheet that participation was voluntary, they did not have to participate if they did not want to and they could withdraw from completing the questionnaire at any point. In retrospect, it would also have been appropriate to clarify that although they could withdraw from the study during completion, once submitted (online) it was impossible to withdraw as the responses were anonymous and their response impossible to identify.

3.6.5 Conclusion

Despite the methodological limitations of the study, the findings indicate that work ability, and to a lesser extent personality, are importantly associated with on workers' health, wellbeing, and organisational effectiveness. The strength of relations between work ability and core self-evaluation in relation to workers' health, wellbeing, and organisational effectiveness indicates that these constructs might offer valuable avenues for enhancing the status of these outcomes. Additionally, the comparative findings of the CSE and the five-factor model contribute to the validity of the emerging CSE in personality research. Further analysis of the rationale for the use of CSE in relation to the Big Five is addressed more fully in the discussion section (6.1.2). The chapter that follows seeks to address some of the methodological limitations of the current study and verify the current findings using a longitudinal research design.

Chapter Four: The longitudinal contribution of work ability and personality to worker health and operational effectiveness (Study 3)

4.1 Abstract

This chapter reports on the longitudinal survey-based study (study 3) that was conducted as part of the investigation on which the thesis is based. The primary aim of the study is to investigate the longitudinal relationship between Time 1 predictors and Time 2 outcomes and to compare the current findings with the cross-sectional analyses from Study 2. Participants were drawn from the same sample described in Study 2 (Chapter 3). A total of 74 matched and valid questionnaires were analysed using bivariate correlations and hierarchical linear regression analyses, regressed against Time 2 (T2) outcomes while controlling for the outcome variables at Time 1 plus the covariates at Time 1. The results indicated that the majority of explained variance in the dependent variables is attributed to the T1 dependent variables, suggesting that these were highly stable over time. The addition of work ability at T1 and personality dimensions – core self-evaluation and the Big Five – at T1 failed to explain a significant portion of the variance in each of the dependent variables at 19-month follow up.

This is the first study to have explored relations between work ability, personality, and individual health and organisational effectiveness variables using a longitudinal design.

4.2 Introduction

Chapter three presented the method, result, and a discussion from Study 2. In that study, a cross-sectional design was employed to examine the simultaneous relationships between work ability and a host of individual indices (psychological distress, job stress, job satisfaction, and organisational effectiveness indices (work engagement, sickness absence). The extent to which personality might account for additional variance in these indices over and above that accounted for work ability was also examined. The findings from the cross-

sectional study indicate that work ability, and to a lesser extent, personality, are important influences on workers' health, wellbeing and organisational effectiveness.

4.3 Aims of the current study

The previous chapter presented cross-sectional associations between work ability, personality, and a host of target variables concerned with workers' health and operational effectiveness. However, the limitations of the cross-sectional design are such that it was not possible to establish patterns of causation between variables; rather, it was possible only to provide information on the co-occurrence of variables (Taris & Kompier, 2003).

Moreover, the cross-sectional design was unable to establish the stability of relations between the variables over time. Where a series of statistically significant relationships are identified between the independent and dependent variables in a cross-sectional study, it is possible to draw erroneous conclusions on the nature of relations between variables owing to the dynamic and fluid nature of links between work and health. The longitudinal design that involves data collection at multiple points in time can overcome this limitation. Such was illustrated clearly in a study of relations between stress-related working conditions and self-reported health status among employees of a French electrical company (Niedhammer & Chea, 2003). The authors found that: "Whereas the cross-sectional analysis showed significant associations between the four scales and self-reported health for both men and women, the prospective [longitudinal] analysis showed that at one year of follow up, psychological demands for both sexes, decision authority for men only, and social support and physical demands for women only, were significant predictors of poor self-reported health" (p. 513). Thus, whereas the cross-sectional examination showed that several aspects of the work environment were associated with health, when explored longitudinally several of these statistically significant relationships fell away, leaving a small set of robust and stable relationships.

These cross-sectional design limitations can be overcome through the application of a longitudinal design in which all variables are measured repeatedly at two or more time points. To date, no study has used a longitudinal design to explore relations between work ability, personality, and the target variables of interest here.

The first aim of the analyses presented in the current chapter was therefore to investigate whether normal causation was present in terms of the extent to which work ability and personality contribute to, or predict, the status of a set of target variables concerned with workers' health and operational effectiveness over time. This was achieved using a longitudinal design with two measurement points 19-months apart. A full panel design was applied whereby all variables were measured at both time points. The expectation was that work ability and personality – conceptualised in terms of core self-evaluation and the Big Five – measured at baseline (T1) would each explain a unique portion of the variance in the target variables measured at follow-up (T2). This design allowed for the establishment of three key conditions that are required for a causal inference to be drawn, namely that (i) the causal variable precedes the outcome variable in time (temporal order), (ii) there is a statistically significant relationship between the predictor variable and outcome variable, and (iii) a theoretical interpretation of the relationship should be possible (Taris & Kompier, 2003). It is important to note that fulfillment of these three criteria in themselves does not permit the researcher to conclude categorically that causation has occurred because it is impossible – even with a longitudinal design – to rule out possible alternative explanations for any statistically significant relationships identified. Rather, “the best we can do is argue that it is plausible that certain statistical associations can be understood in causal terms” (Taris & Kompier, 2003, p. 1).

The second aim was to longitudinally assess the stability of relations between the independent and target variables with a view towards the identification of a robust and stable set of relationships.

This chapter presents the method, results, and discussion of the longitudinal component of the current investigation (Study 3).

Hypothesis 1: Work ability, the Big Five personality traits, and core self-evaluation will be significant predictors of the psychological distress experienced by UK manufacturing employees.

Hypothesis 2: Work ability, the Big Five personality traits, and core self-evaluation will be significant predictors of the job stress experienced by UK manufacturing employees.

Hypothesis 3: Work ability, the Big Five personality traits, and core self-evaluation will be significant stable predictors of the job satisfaction experienced by UK manufacturing employees.

Hypothesis 4: Work ability, the Big Five personality traits, and core self-evaluation will be significant predictors of the work engagement experienced by UK manufacturing employees.

Hypothesis 5: Work ability, the Big Five personality traits, and core self-evaluation will be significant predictors of the sickness absence experienced by UK manufacturing employees.

Similar to the previous chapter, this section is divided into three sections. The first section focuses on the method used to collect the data, while the second presents the results of the correlation and hierarchical regression analyses of longitudinal data. The third and final section consists of a discussion of the longitudinal results.

4.4 Method

4.4.1 Methodological approach

Longitudinal designs can provide information about the temporal order of the events underlying cross-sectional associations, show how the presumed outcomes have changed over time, and whether this change can be ascribed to changes in the independent variables (Taris & Kompier, 2014). Study 2 involved cross-sectional analyses concerning the extent to which work ability accounted for variance in a host of individual and organisational health indices. Study 3 consisted of a repeat of Study 2 following a 19-month interval. A full panel design was applied involving the same questionnaire for both Study 2 and Study 3, thereby enabling longitudinal analyses. Crucially, use of the full panel design allowed for the examination of prospective relations between work ability at baseline and the outcome variables at a future date, while controlling for the influence of possible confounding variables.

4.4.2 Background of the study

The same four UK manufacturing organisations involved in Study 2 were approached to participate in the longitudinal study, however one of the large organisations withdrew from the study at this stage because of pending organisational changes. Data for the longitudinal study was therefore drawn, using the same participants, from the other three organisations involved in Study 2. An application for the longitudinal study was included in the initial research ethics application for Study 2, in accordance with the principles set out by the BPS (British Psychological Society, 2009), and a favourable ethical opinion granted by the research ethics committee of the Institute of Work Health and Organisations at the University of Nottingham.

4.4.3 Data collection procedures

Nineteen months after the gathering of Time 1 (T1) data, another self-report paper-based questionnaire was sent to a HR administrator in the large- and medium-sized participating organisations. An identical online self-report questionnaire was sent to a HR administrator in the third medium-sized organisation, as this was their preferred method of communication. The questionnaire was accompanied by a cover letter, from the researcher, explaining the objectives of the study, procedures for confidentiality and secure storage of the data. As in Time 1, the employees were invited to take part in the survey on a voluntary basis and informed that their individual responses would be anonymous to their organisations but a summary of the results would be available.

The participants were asked the same questions as those at Time 1 and the procedures for protecting participant confidentiality were again followed. Respondents were asked to provide their date of birth to facilitate the matching of responses from Time 1 and Time 2.

In relation to the choice of time lag, this longitudinal study drew on data collected at two time points, 19-months apart, to test the stability of relationships between work ability, personality, individual indices (psychological distress, job stress, job satisfaction), and organisational effectiveness indices (work engagement, sickness absence). The first wave of data collection was labelled Time 1 (T1) and the second wave Time 2 (T2). Longitudinal designs are preferred because they offer better opportunities for making causal inferences about the relationships under investigation (Zapf, Dormann, & Frese, 1996). However, there are no clear guidelines for undertaking longitudinal investigations. In particular, there has been very little discussion about the appropriate time intervals between measures (Ford et al., 2014; Zapf et al., 1996). The time lags on previous longitudinal studies focusing on work ability vary considerably and can be as short as less than a year (Larsson, Karlqvist, & Gard, 2008), 10 years (Airila et al., 2014) using a two wave data collection, or as long as 28 years

using a six wave data collection (von Bonsdorff et al., 2011). There is also varying opinion on the optimal time lag in organisational psychology research. For example, Ford et al. (2014) suggest that the strength of the lagged association between work stressors and strains peaks at, on average, three years after the first study wave and de Lange and colleagues (2004) found that a one year time lag is appropriate for demonstrating the causal relationships between the Demand-Control (support) dimensions and indicators of mental health. In view of past evidence, no conclusive guidelines on longitudinal time lags, and the risk of losing further participants because of employee workforce changes the present study used a time lag of 19 months.

4.4.4 Participants

Participants taking part in the longitudinal study were from the T1 sample (Study 2). The number of valid respondents at Time 1 was 311, after taking into account the numbers from the organisation who withdrew from the study and 29 participants who had left the remaining three organisations during the time lag, 185 questionnaires were administered at T2.

4.4.5 Measures

The measures used in this study were the same as those from the cross-sectional study (see section 3.4.6). Time 1 predictor variables were work ability, core self-evaluations, and the Big Five personality traits, and the outcome variables were psychological distress, job stress, job satisfaction, work engagement, and sickness absence. The control variables were age, gender, and Time 1 outcomes.

4.5 Results

The following section presents the results of the current longitudinal study. These results were derived from bivariate correlation and linear regression analyses conducted using SPSS version 20 (IBM Corp).

4.5.1 Data available for analysis

The surveys were administered in January 2014 to a total of 185 employees. The low number reflects the absence of one of the organisations that withdrew from the investigation upon completion of Study 2, and 29 employees who left the remaining three organisations during the time lag; this reduced the number of employees available to survey by 148. From the original cohort of 185, two employees were excluded because of missing data on the key variables studied which left the number of matched and valid responses at Time 2 to 74.

4.5.2 Response rate

A total of 74 respondents represented a response rate of 22% from the Time 1 study of 333 employees. The matched and valid responses at Time 2 represented 40% of the 185 employees surveyed. To increase the response rate, one reminder was sent by the administrators within each organisation to all employees either via e-mail, if completing the online survey, or verbally in team meetings for those completing the paper-based survey. Potential non-response bias between responders and non-responders was tested by the application of a *t*-test. Table 4.1 presents means, standard deviations and *t*-test results against each of the measures under investigation except gender where, because of dichotomisation of the gender variable, a Chi-square test was used instead as recommended by Morgan et al. (2013). The results demonstrate that, with the exception of age, there were no significant differences between responders at T2 and non-responders.

Table 4.1

Study 3 Comparison of T2 Responders and Non-responders

Measure	T2 Responders Mean (SD)	T2 Non-responders Mean (SD)	<i>t</i>	<i>X</i> ²
Age	44.4 (10.5)	41.2 (10.7)	2.2*	
Gender	-	-	-	.18
Work ability	43.2 (4.2)	42.7 (5.4)	0.6	
CSE	43.2 (9.0)	44.1 (7.6)	-0.8	
Big Five - Extraversion	6.0 (2.1)	6.1 (1.9)	-0.2	
Big Five - Neuroticism	5.3 (2.2)	5.3 (1.9)	-.05	
Big Five - Conscientiousness	8.7 (1.4)	8.7 (1.5)	-.03	
Big Five - Openness	7.0 (1.7)	7.0 (1.5)	0.19	
Big Five - Agreeableness	12.4 (1.5)	12.2 (1.8)	0.96	
Psychological distress	2.2 (3.3)	2.1 (2.9)	2.5	
Job Satisfaction	3.7 (1.1)	3.6 (1.1)	0.77	
Job Stress	2.6 (0.9)	2.6 (0.9)	0.15	
Work engagement	35.5 (8.8)	35.5 (10.6)	0.02	
Absence	1.5 (0.7)	1.7 (0.8)	-1.3	

p* < .054.5.3 Sample size calculation**

G*Power (Faul et al., 2009) was used to determine the sample size required for the study. For linear multiple regression, a minimum sample size of 118 cases was required with alpha set at the 5% level ($\alpha = .05$), power at .8 ($\pi = 0.80$), a minimum effect size of moderate strength ($f^2 = .15$) (Cohen, 1988), and 10 predictor variables (age, gender, outcome variable [T1], Big Five personality variables, work ability, core self-evaluation). The achieved sample size of 74 was somewhat below the power analysis recommendation, indicating that the test may have been underpowered and that caution should be applied in the interpretation of the results.

4.5.4 Descriptive statistics

The descriptive statistics, correlations, and reliability coefficients of the variables in the study are shown in Table 4.2 and 4.3. The correlations were conducted to highlight patterns of relationships between covariates (age, gender), the independent variables at Time 1 (work ability, core self-evaluation, the Big Five) and the dependent variables

(psychological distress, job satisfaction, job stress, work engagement, and sickness absence) at Time 2.

Work ability, core self-evaluation, psychological distress, and job engagement had good to excellent internal consistency, with Cronbach alpha coefficients ranging from .71 to .94. Job satisfaction, job stress, and sickness absence were single items so it was not possible to measure internal consistency due to the narrow range of the question. The internal consistency of the Big Five traits ranged from $r = .58$ to $r = .09$ which is considered medium to low (Cohen, 1988) but consistent with other research using short versions of the Big Five (Gosling et al., 2003; Rammstedt & John, 2007). A measure of central tendency and a measure of dispersion was also calculated for all variables except gender. Several significant relationships were identified in Table 4.2 and 4.3 and in a similar way to Study 2, the size of the correlations was small to moderate in strength (Cohen, 1988).

Work ability at Time 1 (T1) demonstrated a moderate negative association with the individual health variable of psychological distress at Time 2 ($r = -.36$). The weakest associations were with job stress ($r = -.18$) and sickness absence ($r = -.14$).

Core self-evaluation demonstrated a moderate negative relationship with psychological distress ($r = -.46$) and job stress ($r = -.30$) and a positive moderate correlation with job satisfaction ($r = .47$) and work engagement ($r = .50$). The weakest association was with sickness absence ($r = .17$).

Among the Big Five traits at Time 2, neuroticism demonstrated a small to medium negative association with work ability ($r = -.28$) and psychological distress ($r = -.39$), which was smaller than the associations found for the same variables at Time 1. A large negative association with core self-evaluation ($r = -.62$) was found at Time 2, which had increased by $-.8$ from Time 1. Agreeableness demonstrated a small to moderate positive association with work engagement ($r = .28$) and job satisfaction ($r = .32$).

The relationship between work ability (T1) and core self-evaluation (T2) was of moderate strength and positively associated. Given that none of the correlations exceeded a value of more than .70, multicollinearity was not expected to cause problems in the subsequent regression analyses.

Table 4.2

Study 3, Time 1 Longitudinal Descriptive Statistics, Scale Reliabilities and Correlations between Variables (n = 74)

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age (T1)	44.35	10.46	-													
2. Gender (T1)	-	-	-	-.09												
3. Work ability (T1)	43.11	4.25	.71	-.02	-.13											
4. Core self-evaluation (T1)	43.10	9.06	.87	.27*	-.12	.51**										
5. Extraversion (T1)	5.98	2.13	.50	-.08	-.20	.08	.20									
6. Neuroticism (T1)	5.32	2.12	.57	-.14	.06	-.35**	-.55**	-.23								
7. Conscientiousness (T1)	8.74	1.46	.31	.27*	-.15	.15	.25*	.10	-.09							
8. Openness (T1)	6.97	1.70	.22	.18	.10	-.11	.06	-.64**	.01	-.05						
9. Agreeableness (T1)	12.32	1.52	.25	.19	-.24*	.33**	.42**	.03	-.22	.47**	-.05					
10. Psychological distress (T1)	2.26	3.47	.94	-.14	.10	-.50**	-.59**	.01	.20	.24	-.03	-.16				
11. Job satisfaction (T1)	3.71	1.06	-	.15	-.20	.33**	.43**	.12	-.19	.22	.05	.36**	-.10			
12. Job stress (T1)	2.64	0.86	-	-.08	.25*	-.25*	-.43**	-.36**	.23*	-.14	.11	-.07	.34**	-.26*		
13. Work engagement T1)	35.79	8.67	.93	.23	-.26*	.33**	.53**	.09	-.41**	.27*	-.05	.09	-.27*	.65**	-.18	
14. Absence (T1)	1.54	0.72	-	-.08	-.18	-.25*	-.20	-.03	.37**	.12	.07	.09	.19	.06	.02	-.19

* $p < .05$; ** $p < .01$

Table 4.3

Study 3, Time 2 Longitudinal Descriptive Statistics, Scale Reliabilities, and Correlations between Variables (n = 74)

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age (T1)	44.35	10.46	-													
2. Gender (T1)	-	-	-	-.09												
3. Work ability (T2)	42.02	5.57	.84	-.10	.09											
4. Core self-evaluation (T2)	44.50	9.08	.88	.24*	-.08	.52**										
5. Extraversion (T2)	7.17	2.15	.58	.25*	-.16	.11	.32**									
6. Neuroticism (T2)	5.01	2.16	.50	-.31**	.03	-.28*	-.62**	-.34**	.							
7. Conscientiousness (T2)	8.69	1.48	.33	.16	-.24*	.04	.10	-.10	-.25*							
8. Openness (T2)	6.94	1.77	.09	-.17	.15	-.09	.03	-.03	.04	-.10						
9. Agreeableness (T2)	12.10	2.03	.41	.24*	-.09	.23*	.21	-.12	-.07	.19	.07					
10. Psychological distress (T2)	1.63	2.60	.86	-.21	-.13	-.36**	-.46**	-.12	-.39**	.04	.08	-.20				
11. Job satisfaction (T2)	3.58	1.21	-	.21	.02	.29*	.47**	.20	-.10	.10	-.09	.32**	-.40**			
12. Job stress (T2)	2.66	0.92	-	-.16	.01	-.18	-.30*	-.07	.16	.09	-.08	-.01	.27*	-.13		
13. Work engagement T2)	35.28	10.22	.93	.26*	-.01	.30**	.50**	.15	-.24*	.14	-.05	.28*	-.36**	.49**	-.19	
14. Absence (T2)	1.63	0.90	-	-.12	-.18	-.14	-.17	.11	.31**	.30*	-.03	.06	.21	-.01	-.11	-.15

* $p < .05$; ** $p < .01$

4.5.5 Inferential analyses

The results of the hierarchical linear regressions are reported in Tables 4.4-4.8. The covariates (age, gender, and the dependent variable at Time 1) were entered at the first step to control for their possible influence on the dependent variables (Model 1). Work ability was entered at the second step to assess its direct effect on the dependent variables (Model 2). The Big Five personality traits were entered at the third step and CSE at the fourth step to assess the extent to which they accounted for variance in the dependent variables over and above that accounted for by work ability.

The results for the longitudinal regression analysis with psychological distress at 19-month follow up (T2) as the dependent variable are shown in Table 4.4. The covariates (age T1, gender, psychological distress T1) were entered into the first block of the regression model. These explained 26% of the variance in psychological distress (Model 1: R^2 adj. = 0.26) at follow-up, with only psychological distress at T1 significantly contributing to the model ($p < .001$). Model 1 was statistically significant.

Work ability was entered in the second block of the regression model. The addition of work ability explained 1% extra variance as compared to model 1 (Model 2: R^2 adj. = 0.27), although this change was not statistically significant.

The Big Five personality traits were entered in the third block of the regression model. The addition of the Big Five personality traits explained 5% extra variance as compared to Model 2 (Model 3: R^2 adj. = 0.32), with only one of the five personality traits – neuroticism – significantly contributing to model 3 ($p < .05$). The change between Model 2 and Model 3 was not statistically significant.

Core self-evaluation was entered in the fourth block of the regression model. The addition of core self-evaluation explained 3% extra variance as compared to Model 3 (Model 4: R^2 adj. = 0.35). The change between Model 3 and Model 4 was not statistically significant.

These findings indicate that the vast majority of explained variance in psychological distress at 19-month follow-up (T2) was accounted for by psychological distress at baseline (T1), indicating that the level of psychological distress was relatively stable over time in this sample. Thus, the best predictor of future psychological distress was baseline psychological distress.

Though the addition of work ability (Model 2), the Big Five personality traits (Model 3), and core self-evaluation (Model 4) failed to explain a statistically significant additional portion of the variance in the outcome variable over and above that accounted for by the covariates (Model 1), the percentage change in variance accounted for between some models was notable. For example, the addition of the Big Five personality traits added 5% explanatory power to the overall regression model. In the same way, the addition of core self-evaluation explained a further 3% of the variance over and above that accounted for by the Big Five personality traits. The failure of these contributions to reach statistical significance is likely to be because of the relationship between participant sample size and statistical significance that can make it difficult to identify significant results in small samples.

Table 4.4

Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Predicting Psychological Distress (n = 74)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	-.04	.03	-.16	-.04	.03	-.18	-.06	.03	-.25*	-.05	.03	-.23*
Gender	-.55	.36	-.16	-.60	.36	-.18	-.88	.37	-.26*	-.81	.36	-.24*
Psychological Distress (T1)	.36	.08	.49***	.29	.09	.40**	.30	.09	.41**	.21	.10	.28*
Model 2												
Work Ability				-.10	.07	-.18	-.13	.07	-.22	-.11	.07	-.18
Model 3												
Extraversion							-.29	.17	-.25	-.18	.18	-.16
Neuroticism							-.29	.13	-.26*	-.39	.14	-.34**
Conscientiousness							.35	.21	.20	.38	.21	.22
Openness							-.03	.20	-.02	.08	.21	.05
Agreeableness							-.33	.20	-.20	-.23	.20	-.14
Model 4												
Core Self Evaluation										-.08	.05	-.29
R ²	.29			.32			.41			.44		
R ² adj.	.26			.27			.32			.35		
F for change in R ²	9.10***			2.24			1.90			3.241		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; adj. R², adjusted explained variance.

The results for the longitudinal regression analysis with job stress (T2) as the dependent variable are shown in Table 4.5. The covariates (age T1, gender, job stress T1) were entered into the first block of the regression model. These explained 32% of the variance in job stress (Model 1: R² adj.= 0.32) at follow-up, with only job stress at T1 significantly contributing to the model ($p < .001$). Model 1 was statistically significant.

Work ability was entered in the second block of the regression model. The addition of work ability slightly reduced the explanatory power of the model (Model 2: R^2 adj. = 0.31), although this change was not statistically significant.

The Big Five personality traits were entered in the third block of the regression model. The addition of the Big Five personality traits explained 2% extra variance as compared to Model 2 (Model 3: R^2 adj. = 0.33), with only one of the Big Five personality traits – conscientiousness – significantly contributing to model 3 ($p < .05$). The change between Model 2 and Model 3 was not statistically significant.

Core self-evaluation was entered in the fourth block of the regression model. The addition of core self-evaluation slightly reduced the explanatory power of the model (Model 4: R^2 adj. = 0.32). The change between Model 3 and Model 4 was not statistically significant.

These findings indicate that the vast majority of explained variance in job stress at nineteen-month follow-up (T2) was accounted for by job stress at baseline (T1), indicating that the level of job stress was relatively stable over time in this sample. Thus, the best predictor of future job stress was baseline job stress.

Table 4.5

Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Predicting Job Stress (n = 74)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	-.01	.01	-.14	-.01	.01	-.15	-.01	.01	-.17	-.01	.01	-.17
Gender	-.17	.13	-.14	-.17	.13	-.14	-.15	.13	-.12	-.15	.13	-.12
Job stress (T1)	.63	.11	.58***	.62	.12	.57***	.68	.12	.63***	.68	.13	.63***
Model 2												
Work Ability				-.01	.02	-.04	-.01	.02	-.05	-.01	.03	-.05
Model 3												
Extraversion							.03	.06	.08	.03	.06	.08
Neuroticism							.01	.05	.02	.01	.05	.02
Conscientiousness							.15	.07	.25*	.15	.07	.25*
Openness							-.03	.07	-.07	-.03	.07	-.07
Agreeableness							-.04	.07	-.07	-.04	.07	-.08
Model 4												
Core Self Evaluation										-.00	.02	.01
R^2	.35			.35			.41			.41		
R^2 adj.	.32			.31			.33			.32		
F for change in R^2	11.94***			.184			1.37			.002		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; adj. R^2 , adjusted explained variance.

The results for the longitudinal regression analysis with job satisfaction at 19-month follow up (T2) as the dependent variable are shown in Table 4.6. The covariates (age T1, gender, job satisfaction T1) were entered into the first block of the regression model. These explained 27% of the variance in job satisfaction (Model 1: R^2 adj. = 0.27) at follow-up, with only job satisfaction at T1 significantly contributing to the model ($p < .001$). Model 1 was statistically significant.

Work ability was entered in the second block of the regression model. The addition of work ability explained 1% extra variance as compared to model 1 (Model 2: R^2 adj. = 0.28), although this change was not statistically significant.

The Big Five personality traits were entered in the third block of the regression model. The addition of the Big Five personality traits explained 4% extra variance as compared to Model 2 (Model 3: R^2 adj. = 0.32), with none of the five personality traits significantly contributing to model 3. The change between Model 2 and Model 3 was not statistically significant.

Core self-evaluation was entered in the fourth block of the regression model. The addition of core self-evaluation explained 5% extra variance as compared to Model 3 (Model 4: R^2 adj. = 0.37). The change between Model 3 and Model 4 was statistically significant ($p < .05$).

These findings indicate that the vast majority of explained variance in job satisfaction at nineteen-month follow-up (T2) was accounted for by job satisfaction at baseline (T1), indicating that the level of job satisfaction was relatively stable over time in this sample. Thus, the best predictor of future job satisfaction was baseline job satisfaction. Notable among these findings is the significant addition made to the overall regression model by the addition of CSE in the fourth step. This resulted in the explanation of a further 5% of the variance over and above that accounted for by the Big Five personality traits. It is interesting that for the outcome variable under consideration here – job satisfaction – CSE made a significant contribution, which was not the case for the other longitudinal regression models presented here. This finding serves to highlight the relevance of CSE to the prediction of future job satisfaction.

Table 4.6

Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Predicting Job Satisfaction (n = 74)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	.02	.01	.15	.02	.01	.16	.02	.01	.21	.02	.01	.15
Gender	.22	.17	.13	.23	.17	.14	.35	.18	.21*	.33	.17	.20
Job Satisfaction (T1)	.60	.12	.52***	.55	.13	.48***	.50	.13	.43***	.44	.13	.39**
Model 2												
Work Ability				.04	.03	.14	.04	.03	.14	.01	.03	.04
Model 3												
Extraversion							.14	.08	.25	.10	.08	.18
Neuroticism							.08	.06	.14	.14	.07	.24*
Conscientiousness							-.14	.10	-.18	-.15	.09	-.18
Openness							.01	.10	.02	-.03	.10	-.04
Agreeableness							.19	.10	.24	.15	.10	.19
Model 4												
Core Self Evaluation										.04	.02	.33*
R ²	.31			.32			.41			.46		
R ² adj.	.27			.28			.32			.37		
F for change in R ²	9.95***			1.77			1.74			5.51*		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; adj. R², adjusted explained variance.

The results for the longitudinal regression analysis with work engagement at 19-month follow up (T2) as the dependent variable are shown in Table 4.7. The covariates (age T1, gender, work engagement T1) were entered into the first block of the regression model. These explained 47% of the variance in work engagement (Model 1: R² adj. = 0.47) at follow-up, with only work engagement at T1 significantly contributing to the model ($p < .001$). Model 1 was statistically significant.

Work ability was entered in the second block of the regression model. The addition of work ability explained 1% extra variance as compared to model 1 (Model 2: R^2 adj. = 0.48), although this change was not statistically significant.

The Big Five personality traits were entered in the third block of the regression model. The addition of the Big Five personality traits explained no further variance as compared to Model 2 (Model 3: R^2 adj. = 0.48). The change between Model 2 and Model 3 was not statistically significant.

Core self-evaluation was entered in the fourth block of the regression model. The addition of core self-evaluation explained 1% extra variance as compared to Model 3 (Model 4: R^2 adj. = 0.49). The change between Model 3 and Model 4 was not statistically significant.

These findings indicate that the vast majority of explained variance in work engagement at 19-month follow-up (T2) was accounted for by work engagement at baseline (T1), indicating that the level of work engagement was relatively stable over time in this sample. Thus, the best predictor of future work engagement was baseline work engagement.

Table 4.7

Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Predicting Work Engagement (n = 74)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1												
Age	.13	.09	.14	.14	.09	.15	.17	.09	.18	.14	.09	.15
Gender	2.30	1.27	.16	.2.39	1.27	.17	3.14	1.33	.22*	2.89	1.33	.21*
Work Engagement (T1)	.82	.11	.69***	.78	.12	.65***	.85	.13	.71***	.80	.14	.67***
Model 2												
Work Ability				.24	.22	.10	.34	.23	.15	.20	.25	.09
Model 3												
Extraversion							1.06	.60	.22	.83	.62	.18
Neuroticism							.81	.52	.17	1.02	.54	.22
Conscientiousness							-.70	.71	-.10	-.69	.71	-.10
Openness							.52	.74	.09	.29	.75	.05
Agreeableness							.31	.75	.05	.10	.76	.02
Model 4												
Core Self Evaluation										.20	.15	.18
R ²	.50			.51			.55			.56		
R ² adj.	.47			.48			.48			.49		
F for change in R ²	21.73***			1.200			1.04			1.83		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; adj. R², adjusted explained variance.

The results for the longitudinal regression analysis with sickness absence at 19-month follow up (T2) as the dependent variable are shown in Table 4.8. The covariates (age T1, gender, sickness absence T1) were entered into the first block of the regression model. These explained 46% of the variance in sickness absence (Model 1: R² adj.= 0.46) at follow-up, with only sickness absence at T1 significantly contributing to the model ($p < .001$). Model 1 was statistically significant.

Work ability was entered in the second block of the regression model. The addition of work ability explained no further variance as compared to model 1 (Model 2: R^2 adj. = 0.46).

The Big Five personality traits were entered in the third block of the regression model. The addition of the Big Five personality traits explained 4% extra variance as compared to Model 2 (Model 3: R^2 adj. = 0.50), with only one of the five personality traits - conscientiousness - significantly contributing to model 3 ($p < .01$). The change between Model 2 and Model 3 was not statistically significant.

Core self-evaluation was entered in the fourth block of the regression model. The addition of core self-evaluation slightly reduced the explanatory power of the model (Model 4: R^2 adj. = 0.49). The change between Model 3 and Model 4 was not statistically significant.

These findings indicate that the vast majority of explained variance in sickness absence at nineteen-month follow-up (T2) was accounted for by sickness absence at baseline (T1), indicating that the level of sickness absence was relatively stable over time in this sample. Thus, the best predictor of future sickness absence was baseline sickness absence.

Table 4.8

Longitudinal Hierarchical Regression Analysis for Work Ability, the Big Five Personality Traits, and Core Self Evaluation Predicting Sickness Absence (n = 74)

Variable	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Model 1												
Age	-.01	.01	-.07	-.01	.01	-.07	-.01	.01	-.12	-.01	.01	-.10
Gender	-.10	.11	-.08	-.10	.11	-.08	-.07	.11	-.05	-.06	.11	-.05
Absence (T1)	.82	.11	.67***	.82	.12	.67***	.74	.12	.60***	.74	.12	.60***
Model 2												
Work Ability				-.00	.02	-.01	-.00	.02	-.01	.01	.02	.02
Model 3												
Extraversion							.06	.05	.15	.07	.05	.17
Neuroticism							.04	.04	.10	.03	.05	.07
Conscientiousness							.17	.06	.27**	.17	.06	.28**
Openness							.03	.06	.06	.04	.07	.08
Agreeableness							-.04	.06	-.07	-.03	.06	-.05
Model 4												
Core Self Evaluation										-.01	.01	-.10
R^2	.49			.49			.56			.57		
R^2 adj.	.46			.46			.50			.49		
F for change in R^2	21.41***			.02			2.06			.59		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; *SE B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; adj. R^2 , adjusted explained variance.

The contribution of the Big Five 5 personality traits and core self-evaluation to the prediction of the criterion variables indicated that CSE accounted for a greater portion of the variance than the Big Five personality traits for only one dependent variable (job satisfaction). For all dependent variables, with the exception of work engagement, the Big Five traits accounted for a larger portion of the variance with neuroticism and conscientiousness the only factors making a significant contribution to the explanation of psychological distress, job stress and sickness absence. Table 4.9 summarises the differences

in variance between CSE and the Big Five from the longitudinal hierarchical regression analyses described in this study.

Table 4.9

Study 3 Overview of CSE and the Big Five Contribution

Dependent Variable	Covariates (age, gender, T1 dependents)	Big Five	CSE
Psychological distress	26%	5% (neuroticism)	3%
Job stress	0%	2% (conscientiousness)	-1%
Job satisfaction	2%	4%	5%
Work engagement	4%	0%	1%
Sickness absence	5%	4% (conscientiousness)	-1%

4.6 Discussion

4.6.1 Summary of findings

The primary purpose of this longitudinal study was to investigate whether normal causation was present in terms of the extent to which work ability and personality contribute to – or predict – the status of a set of target variables concerned with workers’ health and operational effectiveness over time. In Study 2, a cross-sectional investigation was undertaken and the results provided some indication of the relationships between these variables. In general, the results indicated that the vast majority of explained variance in the dependent variables is attributed to work ability, though for each outcome (with the exception of sickness absence) a significant portion of the variance over and above that explained by work ability was accounted for by core self-evaluation and the Big Five (Table 3.8). The current longitudinal study provided findings that can be used to assess whether work ability and personality traits are stable predictors over time of the five individual and organisational variables presented in the cross-sectional study.

Work ability (T1) and the personality constructs (T1) failed to explain a significant additional portion of the variance over and above that explained by the dependent variables of sickness absence, psychological distress, job satisfaction, job stress, work engagement, and sickness absence at T1. This study found that work ability, core self-evaluation, and the Big Five were related to psychological distress, job stress, job satisfaction, work engagement, and sickness absence at 19-month follow-up, although the size of these effects was relatively small. It should be noted, though, that longitudinal effects are always smaller and more difficult to detect than cross-sectional ones (Ford et al., 2014) and the size of the sample in this present study was underpowered as demonstrated in 4.5.3. Also, in this study, the level of the dependent variable at T1 was controlled for in the regression analysis. As demonstrated by the relatively unchanged coefficients and descriptive scores the variables were stable over time and so it can be concluded that a large portion of the variance in the dependent variable was already accounted for by variables measured 19-months earlier. This means that the portion of variance left to be explained was rather small.

4.6.2 Findings compared to previous studies

As indicated in Study 2 this is the first investigation to examine relationships between work ability and personality, using the CSE and the Big Five traits, in relation to individual health and organisational effectiveness constructs. Direct comparison to previous studies that replicate this current study is therefore not possible because of over-representation of cross-sectional design and lack of longitudinal analysis on the construct of CSE (Chang, Ferris, Johnson, Rosen, & Tan, 2012). However, as in Study 2, findings from previous studies can be drawn if the constructs of sickness absence, job stress, work engagement, job satisfaction, and psychological distress are examined individually.

CSE has been associated with fewer perceived stressors (Kammeyer-Mueller et al., 2009) and no significant change in CSE because of job stress over a lag of three months,

which suggests some degree of stability (Judge et al., 2003). Moreover, CSE has been positively associated with work engagement (Lee & Ok, 2015) and job satisfaction (Iqbal, 2012; Judge et al., 2005; Lemelle & Scielzo, 2012). High CSE was reported by Liu, Li, Fan, & Nauta (2015) as moderating the effects of employee absence and lateness in China and the United States, and it is also suggested that the disposition of an individual can play a crucial role in psychological health (Abikoye & Sholarin, 2012; Galvin & Smith, 2015).

While numerous studies have been published using the Big Five traits a constraint to comparing the findings of this present study is the extent to which there are different measurement instruments used to assess the Five Factor model. A content analysis by Zillig, Hemenover, & Dienstbier (2002) identified this as an issue when examination of the popular Big Five inventories cited in studies were found to vary widely in length, format, theoretical origin, and usage. This was not found to be an issue with CSE as there is only one 12 item measure commonly used which provided consistency to comparable research. Similarly to CSE research, there is also over-representation of Big Five cross-sectional studies (Woods, Lievens, De Fruyt, & Wille, 2013) particularly in occupational wellbeing research (Mäkikangas et al., 2013). Previous studies identified that among the Big Five traits there are some general conclusions and work outcomes established in relation to work performance and job types, such as sales and extraversion (Barrick, Stewart, & Piotrowski, 2002) which to a large extent has been influenced by the application of personality assessment to select job applicants to the demands of the job (Matthews et al., 2009, p. 411). Nevertheless, meta-analysis findings and reviews have indicated that the conscientiousness trait is a reliable predictor of performance in most jobs (Barrick & Mount, 1991, Hurtz & Donovan, 2000, Mäkikangas et al., 2013) and in this present study conscientiousness was found to significantly contribute to job stress and sickness absence. Neuroticism is a further trait commonly associated with the ability to cope with a stress response (Schneider, 2004) and

while there was no significant association with job stress in this study, there was a significant association with psychological distress.

Work-related factors are among the most important factors associated with work ability among adults (Alavinia, van Duivenbooden, & Burdorf, 2007) and although associations and relationships between specific work-related factors and good and poor work ability among adults have been reported (van den Berg et al., 2008) few such studies have been longitudinal in their design. Previous longitudinal work ability studies have focused on age related changes in association with work ability and determined that for most respondents with stable work ability there was either no or a minor (1 point) change within a 10-year period (Tuomi et al., 1997; von Bonsdorff et al., 2011) which is very similar to the results in this current study. In addition, Feldt, Hyvönen, Oja-Lipasti, Kinnunen, & Salmela-Aro (2012) and von Bonsdorff et al. (2011) report that current work ability of middle aged employees could be an early predictor of functioning in old age in relation to disease and chronic illness. A two wave 10-year longitudinal design examining the mediating effect of work engagement on work ability found that work ability at T1 predicted 21% of work ability at T2, as well as 12% variance in work engagement at T2 (Airila et al., 2012). In this current study the mean age was lower than that reported by previous studies on work ability (Airila et al., 2012; Lindberg, Josephson, Alfedsson, & Vingard, 2012; von Bonsdorff et al., 2011,) and so it could be that the cohort was too young and the time lag too short to demonstrate any significant differences in the longitudinal regression analysis with sickness absence and work engagement. What is not known is whether the same could be concluded for the other variables studied because of a lack of available longitudinal research. The findings of a study on the association of productivity and work ability did not relate as strongly to changes in work ability and productivity over a 1-year time lag (Leijten et al., 2014). The researchers observed the possibility that a health problem, which initially causes a decrease in work

ability when measured at baseline, is mitigated by the adaptation of the worker to the health problem or by adjustments in the workplace. This would then explain small changes during follow up period.

4.6.3 Implications of the current study

The purpose of this study was to examine whether the WAI, the Big Five, and core self-evaluation were good instruments to longitudinally predict the five dependent variables of psychological distress, job stress, job satisfaction, work engagement, and sickness absence. The majority of explained variance in all five variables at T2 was accounted for at T1 which indicates that all these variables are stable as a baseline measure.

Personal resources, such as personality traits, are individual differences that a person brings to an organisation rather than factors influenced by the organisational work environment (Palermo et al., 2013). Judge et al. (1998) proposed that CSE has a positive effect on motivation to perform and subsequently on the level of job performance. They argued that appraisal theory, self-consistency theory, the human relations movement, learned helplessness theory, and control theory, all lead to the conclusion that those high in core self-evaluations will on average be better job performers than those who are low. They also proposed that for some jobs core self-evaluations may represent an ability factor. Thus, it would be expected that measures of core self-evaluations and job performance correlate.

Traditionally, work ability measures, such as the work ability index used in this study, have included assessment of individual's illnesses and impairments which has led to work ability being viewed from a negative perspective that is occupational stress, disease, mental illness, and symptoms. In the WAI, the questions about diseases and health cover 51% of the WAI which has led to the suggestion that the WAI is an individually-orientated method focused on disability rather than a method for reflecting work characteristics (Pohjonen, 2001). More recently there has been a view that health certainly affects, but does not entirely

determine a person's ability to work (Ilmarinen et al., 2015; Tengland, 2011) and as a consequence focus has gradually shifted from stress and illness to social psychological processes that contribute to and enhance wellbeing (Airila et al., 2014). More recent occupational health research has demonstrated significant correlations between psychosocial risk factors and WAI scores, particularly those found to influence early retirement (Uronen et al., 2017). This has led to a recommendation by the authors to document and track psychosocial risk factors and develop interventions (Uronen et al., 2017). Further research is therefore clearly necessary to adapt the WAI to adopt a balanced approach to the assessment of whether targeted interventions and the contribution of personal resources mitigates and/or contributes to good and poor work ability.

4.6.4 Limitations of the current study

Limitations within this study require consideration when interpreting these findings. The results should be interpreted with caution because of the following reasons.

The longitudinal sample size was small, comprising of only 74 employees, and had a response rate of 22%. As demonstrated in 4.5.3, a sample size calculation indicated that 118 cases were required for linear multiple regression analyses in this present study; as there were only 74 respondents, the study was 44 participants too short. It can therefore be concluded that the study was highly likely to have been "underpowered" (Maxwell, 2004), that is, have had insufficient statistical power to detect cause and effect. As previously discussed in Chapter 3 (3.5.5) the sample also comprised of employees working in the manufacturing sector where generalisation to the whole sector workforce was difficult to establish.

The same self-report measures were used to collect the data as Study 2. It is often argued that exclusive reliance on self-reports would result in an overestimation of the associations among variables because of common method variance. However, Spector (2006) thoroughly studied the potential problem of common method variance and mentions three

factors that mitigate the problems associated with using self-report measures: (i) The use of self-reports does not guarantee finding significant results; (ii) potential biasing variables (e.g. negative affectivity, social desirability) do not generally inflate correlations among study variables; (iii) mono-method correlations are not necessarily higher than multimethod correlations. Therefore, Spector (2006) concludes that “the popular position suggesting that common method variance automatically affects variables measured with the same method is a distortion and oversimplification of the true state of affairs” (p. 221). Based on these considerations, it is proposed that common method variance did not significantly bias the results of this current study.

Another potential limitation is the selective dropout from the study that in this current study was a combination of withdrawal from one of the four companies initially involved and 29 individual employees from the participating three companies. The sample could therefore have been quantitatively different from those who did not participate leading to a healthy worker effect and as a consequence bias. While the withdrawal of a large sample of potential respondents is likely to have substantially reduced the overall response rate, there is little evidence that there was a non-response bias as the application of a *t* test to T2 responders and non-responders from the cross-sectional study identified no significant difference between the groups with the exception of age.

4.6.5 Conclusion

Despite the methodological limitations of the study, the findings confirm that at baseline, work ability – and to a lesser extent personality – were associated with factors such as psychological distress, job stress, job satisfaction, work engagement, and sickness absence. However, predictive effects were small.

By studying health protecting resources and personal resources such as core self-evaluation, this small scale exploratory study can help stimulate a new dimension to work

ability research by investigating both the positive and negative aspects of a person-centered approach to variables such as psychological distress, job stress, job satisfaction, work engagement, and sickness absence. This study aims to not only contribute to the empirical base on employee motivation, a neglected aspect of work ability, but also to expand on previous research by considering that individual personal resources may be considered a health-related resource that may have a beneficial effect on work ability in the long term. For example, Ojala¹, Nygård¹, Huhtala¹, & Nikkari (2017) in a study of Finnish public health workers found that an intervention of early rehabilitation cognitive therapy produced a significant increase in Work Ability Index scores. This different focus of the use of work ability provides considerable scope to designing new and different ways to intervene and support employees in the workplace which focus on the combination of work ability and personal resource initiatives to then maintain and promote the concept of self-efficacy, self-esteem, locus of control, and healthy neuroticism. The benefit of this approach is not just to enhance the individual wellbeing of the employee, but to also improve job motivation which has an organisational benefit at primary level.

Chapter Five: Single item work ability score versus multi-item work ability index (Study 4)

5.1 Abstract

Work ability is an index of self-perceived capability to fulfill the mental and physical demands of the job (Noone, Mackey, & Bohle, 2014). In recent times, a single item work ability score (WAS) has emerged as a quick-to-administer and interpret alternative to established multi-item versions of the work ability index (WAI). Research is needed to examine the effectiveness of the WAS relative to the WAI in terms of the prediction of worker health and organisational effectiveness outcomes. This study prospectively compares the WAS and the WAI in terms of the prediction of individual health (job satisfaction, psychological distress, job stress) and organisational effectiveness (sickness absence, work engagement) in the UK manufacturing context. This prospective cohort study comprised 74 manual workers who completed the WAI and WAS at baseline and reported the outcome variables at 19-month follow-up. A two-step hierarchical regression was performed for each of the target variables. Socio-demographic variables (age, gender) were entered in the first step so as to control for their possible effects on the criterion variables. In the second step, either the WAI or the WAS was entered. For each outcome variable, the WAI explained a greater portion of variance than the WAS, after controlling for the possible influence of age and gender at baseline: Psychological distress (WAI, $\Delta R^2 = .15$; WAS, $\Delta R^2 = .02$), job stress (WAI, $\Delta R^2 = .04$; WAS, $\Delta R^2 = .01$), absence (WAI, $\Delta R^2 = .03$; WAS, $\Delta R^2 = .00$), work engagement (WAI, $\Delta R^2 = .09$; WAS, $\Delta R^2 = .02$), job satisfaction (WAI, $\Delta R^2 = .08$; WAS, $\Delta R^2 = .01$).

The WAI performed better than the WAS in terms of the prediction of each index of individual health and organisational effectiveness. This study contributes to the evidence for the utility of the multi-item Work Ability Index (WAI). For the purpose of identifying

workers at risk of psychological ill-health and organisational ineffectiveness the multi-item WAI might be better suited than the single item WAS.

5.2 Introduction

In Study 2 (chapter 3) and Study 3 (chapter 4) the short 14 disease item version of the Work Ability Index (WAI) instrument was used to examine cross-sectional and longitudinal relations between work ability and a host of individual indices (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence). In recent times a single item measure of work ability, the Work Ability Score (WAS) has emerged as an alternative to multi-item measures such as the short 14 disease item version of the Work Ability Index (WAI). The overall objective of the study described in the current chapter is to compare these two instruments in terms of their ability to predict a range of individual and organisational health outcomes.

There is a strong imperative for brief measurement instruments in occupational health practice. From the employer perspective, a key benefit of a single item measurement tool is the reduction in employee downtime. Brief measures are also advantageous in that they have the potential to decrease the risk of a participant's data representing a response set and typically generate a response rate superior to that achieved by lengthy measures. Systematic reviews of response rates achieved in health focused studies have consistently demonstrated an inverse relationship between questionnaire length and response rate (Edwards et al., 2002; Edwards, 2004).

There are three versions of the WAI: Long, short, and single item. The long version has 51 disease list items, the short version has 14 disease list items and the single item version has one question concerning current work ability in relation to lifetime best. The use of the short version has been demonstrated to yield very similar results to the long version

(Nübling et al., 2004), but it nevertheless remains a long instrument that might not be appropriate for application when a priority is placed on brevity and efficiency in assessment.

In response, the single item Work Ability Score (WAS) is increasingly being used by researchers and practitioners to assess work ability (Ahlstrom, Grimby-Ekman, Hagberg, & Dellve, 2010; Carlsen et al., 2013; El Fassi et al., 2013; Harju, Hakanen, & Schaufeli, 2014; Jääskeläinen et al., 2016; Kuijer et al., 2012; Lundin, Leijon, Vaez, Hallgren, & Torgen, 2017; Lundmark, Hasson, von Thiele Schwarz, Hasson, & Tafvelin, 2017; Neupane, Miranda, Virtanen, Siukola, & Nygård, 2011; Plat, Frings-Dresen, & Sluiter, 2012; Spanier, Radoschewski, Gutenbrunner, & Bethge, 2014; Vuokko et al., 2015) because of the benefits in terms of simplicity, cost, and ease of administration and interpretation (Bowling, 2005; El Fassi et al., 2013).

5.3 Aims of the current study

The objective of the present study was to prospectively compare the short 14 disease item WAI to the single item WAS in terms of the prediction of individual health and organisational health indices. While the relative merits of using a single item measure over a multiple item measure have been discussed extensively in the occupational psychology literature in relation to constructs such as job satisfaction (Nagy, 2002; Wanous et al., 1997), researchers have only recently begun to consider the relative merits of multi-item and single item measures of work ability.

Despite its growing popularity, there is a lack of comparative research between the use of the WAI and WAS. Ahlstrom et al. (2010) conducted a three wave longitudinal study on a population of female human service workers on long term sick leave. The results of the study suggest that using a single item question on work ability in occupational and primary care may be a good alternative to using the WAI. Gould et al. (2008) examined data from a nationally representative sample of the Finnish adult population ($n = 5199$) gathered during a

10-month period. Three main indicators of work ability; a three-level self-evaluation of work ability, the use of WAS, and the WAI, were used in addition to a home interview and health examination. The main focus of the study was to gather up to date information on the most important diseases, their causes, and treatment in Finland rather than compare the different work ability measures used. However, in this context, it is reported that there was a strong association between WAS and WAI, but among the age range of 55-64-year-old women, the distribution of the WAS did not correspond with the WAI. Some 60% rated as having excellent or good work ability using the WAI in contrast to 77% using the WAS. Roelen et al. (2014) conducted a prospective cohort study among a population of male construction workers to identify workers at risk of receiving a future disability pension; both the WAI and WAS were used and the results compared. The WAS results demonstrated miscalibration indicating poor accuracy in predicting the risk of a disability pension; it also poorly discriminated between workers at high and low risk of a disability pension. In contrast the WAI calibration and discrimination were both adequate. Lundin et al. (2017) in a general Swedish population study to assess the predictive ability of the WAI as well as its individual items, found the WAI had acceptable predictive validity and was superior in detecting long term sickness absence than the individual items which were less stable; this was similar findings to the Roelen et al. (2014) study. They conclude by suggesting that three items from the WAI may be suitable for public health surveys rather than the commonly used one item – current work ability compared with lifetime best. Jääskeläinen et al. (2016) used national Finnish data ($n = 5\ 251$) to compare the WAI and WAS as predictors of disability pension over a four-year period. The results demonstrated that the WAI was a better predictor than WAS, however the study concludes that the single item WAS – current work ability compared with lifetime best – could be considered a reasonable alternative to WAI in describing the risk of future disability pension and as a prognostic tool. El-Fassi et al. (2013)

compared the use of the WAI and WAS in a 54-month retrospective study of employees affiliated with an occupational health provider in Luxembourg. After removing incomplete questionnaires, 12,839 were selected as the study sample database. The results indicated a convergent validity and similarity in results between the WAS and WAI and as a consequence of the results the occupational health provider decided to integrate WAS, rather than WAI, into the future assessment of workers health.

The six studies described used different study populations, methodology, and reported different results. The findings from one of the studies (El Fassi et al., 2013) led to changes in occupational health practice. This example brings into question whether there is a strong empirical base on which to change practice and whether the gaps in knowledge need further examination. This is particularly important when work ability results could influence decisions concerning fitness for work and disability pensions. This study will therefore contribute to addressing the lack of research in this important area of work ability research, and in particular the discussion on evidence-based practice.

5.4 Method

5.4.1 Background of the study

At baseline (Study 2) both the short 14 disease item Work Ability Index (WAI) and the single item Work Ability Scale (WAS) were administered. This provided an opportunity to assess the relative predictive validity of the two instruments by considering each in relation to a set of outcome variables that were assessed at 19-month follow-up (Study 3). This formed the focus of the analyses presented in the current chapter.

5.4.2 Measures

As previously described in Study 2 (Chapter 3), the short 14 disease item WAI consists of seven dimensions, namely: i) current work ability compared with the lifetime best, ii) work ability in relation to the demands of the job, iii) number of current diseases

diagnosed by a physician, iv) estimated work impairment because of disease, v) sick leave during the past year (12 months), vi) own prognosis of work ability two years from now, and vii) mental resources. The responses to each question are calculated using a key and the scores categorised according to the reference values developed by Tuomi et al. (1998). These range from 7-49 and are classified as follows: 7-27 (poor), 28-36 (moderate), 37-43 (good) and 44-49 (excellent).

The WAS measure used in this study was the single item question ‘Assume that your work ability at its best has a value of 10 points. How many points would you give your current work ability?’ Participants could respond on an 11 point scale, ranging from 0 (completely unable to work) to 10 (workability at its best).

The socio-demographic control measures used were age and gender at Time 1. The dependent variables were psychological distress, job stress, job satisfaction, work engagement, and sickness absence.

5.4.3 Analytical approach

A two-step hierarchical regression was performed for each of the target variables. As per Roelen et al., (2014), prior to entry the WAS and WAI scores were standardised as a percentage of their maximum score and then separate regression analyses were conducted for the WAI and the WAS. Socio-demographic variables (age, gender) were entered in the first step so as to control for their effects on the criterion variables. In the second step, either the WAI or the WAS was entered to assess its direct effect on the dependent variables. All analyses were conducted in SPSS version 21 (IBM Corp).

5.4.4 Power calculation

G*Power (Faul et al., 2007) was used to determine the sample size required for the study. For linear multiple regression a minimum sample size of 77 cases was required with

alpha set at the 5% level ($\alpha = .05$), power at .8 ($\pi = 0.80$), a minimum effect size of moderate strength ($f^2 = .15$) (Cohen, 1988), and three predictor variables (age, gender, work ability).

5.5 Results

The following section presents the results of the current prospective cohort study.

5.5.1 Data available for analysis

As presented in Study 3 (Chapter 4), the number of matched and valid responses at Time 2 was 74 manual workers who completed the WAI and WAS at baseline and reported the outcome variables at 2-year follow up.

Prediction of Psychological Distress. The first regression analysis examined the relationship between the short 14 disease item work ability index (WAI) and psychological distress at follow-up (Table 5.1). The covariates (gender, age) explained 7% of the variance (4% adjusted) in psychological distress at follow-up (Model 1). Model 1 was not significant. The addition of the WAI (Model 2) explained 15% extra variance (15% adjusted) over and above that accounted for by model 1 ($R^2 = 0.22$). Model 2 was significant ($p < .001$).

Table 5.1

Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Psychological Distress at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	-.06	.03	-.23	-.06*	.03*	-.23*
Gender	-.53	.42	-.15	-.74	.39	-.20
Model 2						
WAI				-.12***	.03***	-.39***
R^2	.07			.22***		
R^2 adj.	.04			.19***		
F for change in R^2	2.54			13.68***		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; R^2 adj., adjusted explained variance.

The second regression analysis examined the relationship between the single item measure of work ability (WAS) and psychological distress at follow-up (Table 5.2). The covariates (gender, age) explained 7% of the variance (4% adjusted) in psychological distress at follow-up (Model 1). Model 1 was not significant. The addition of the WAS (Model 2) explained 2% extra variance (1% adjusted) over and above that accounted for by Model 1 ($R^2 = 0.09$). Model 2 was not significant.

Table 5.2

Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Psychological Distress at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	-.23	.03	-.23	-.05	.03	-.23
Gender	-.53	.42	-.15	-.66	.43	-.18
Model 2						
WAS				-.03	.03	-.16
R ²	.07			.09		
R ² adj.	.04			.05		
F for change in R ²	2.54			1.89		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; R² adj., adjusted explained variance.

Prediction of Job Stress. The first regression analysis examined the relationship between the short work ability index (WAI) and stress at follow-up (Table 5.3). The covariates (gender, age) explained 2% of the variance (0% adjusted) in stress at follow-up (Model 1). Model 1 was not significant. The addition of the WAI (Model 2) explained a further 4% of the variance (2% adjusted) over and above that accounted for by Model 1 ($R^2 = 0.06$). Model 2 was not significant.

Table 5.3

Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Job Stress at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	-.01	.01	-.15	-.01	.01	-.16
Gender	-.00	.15	-.00	-.04	.15	-.03
Model 2						
WAI				-.02	.01	-.18
R ²	.02			.06		
R ² adj.	-.00			.02		
F for change in R ²	.869			2.436		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; R^2 adj., adjusted explained variance.

The second regression analysis examined the relationship between the single item measure of work ability (WAS) and stress at follow-up (Table 5.4). The covariates (gender, age) explained 2% of the variance (0% adjusted) in stress at follow-up (Model 1). Model 1 was not significant. The addition of the WAS (Model 2) explained a further 1% in the variance (-1% adjusted) over and above that accounted for by Model 1 ($R^2 = 0.03$). Model 2 was not significant.

Table 5.4

Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Job Stress at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	-.01	.01	-.15	-.01	.01	-.15
Gender	-.00	.15	-.00	-.03	.16	-.02
Model 2						
WAS				-.01	.01	-.10
R ²	.02			.03		
R ² adj.	-.00			-.01		
F for change in R ²	.869			.695		

*p<.05, **p<.01, ***p<.001,

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; R² adj., adjusted explained variance.

Prediction of Sickness Absence. The first regression analysis examined the relationship between the short work ability index (WAI) and sickness absence at follow-up (Table 5.5). The covariates (gender, age) explained 5% of the variance (2% adjusted) in sickness absence at follow-up (Model 1). Model 1 was not significant. The addition of the WAI (Model 2) explained a further 3% of the variance (2% adjusted) over and above that accounted for by Model 1 ($R^2 = 0.08$). Model 2 was not significant.

Table 5.5

Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Sickness Absence at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	-.01	.01	-.14	-.01	.01	-.14
Gender	-.23	.15	-.19	-.27	.15	-.21
Model 2						
WAI				-.02	.01	-.17
R^2	.05			.08		
R^2 adj.	.02			.04		
F for change in R^2	1.83			2.12		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; R^2 adj., adjusted explained variance.

The second regression analysis examined the relationship between the single item measure of work ability (WAS) and sickness absence at follow-up (Table 5.6). The covariates (gender, age) explained 5% of the variance (2% adjusted) in sickness absence at follow-up (Model 1). Model 1 was not significant. The addition of the WAS (Model 2) explained no further variance over and above that accounted for by Model 1 ($R^2 = .05$). Model 2 was not significant.

Table 5.6

Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Sickness Absence at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	-.01	.01	-.14	-.01	.01	-.14
Gender	-.23	.15	-.19	-.23	.15	-.19
Model 2						
WAS				.00	.01	.00
R ²	.05			.05		
R ² adj.	.02			.01		
F for change in R ²	1.83			.00		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; R^2 adj., adjusted explained variance.

Prediction of Work Engagement. The first regression analysis examined the relationship between the short work ability index (WAI) and work engagement at follow-up (Table 5.7). The covariates (gender, age) explained 7% of the variance (4% adjusted) in work engagement at follow-up (Model 1). Model 1 was not significant. The addition of the WAI (Model 2) explained a further 9% of the variance (8% adjusted) over and above that accounted for by Model 1 (R^2 adj. = 0.16). Model 2 was significant ($p < .01$).

Table 5.7

Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Work Engagement at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	.26*	.11*	.26*	.27*	.11*	.27*
Gender	-.03	1.66	-.00	.60	1.60	.04
Model 2						
WAI				.36**	.13**	.30**
R ²	.07			.16**		
R ² adj.	.04			.12**		
F for change in R ²	2.60			7.52**		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; R^2 adj., adjusted explained variance.

The second regression analysis examined the relationship between the single item measure of work ability (WAS) and work engagement at follow-up (Table 5.8). The covariates (gender, age) explained 7% of the variance in work engagement at follow-up (Model 1). Model 1 was not significant. The addition of the WAS (Model 2) explained a further 2% of the variance over and above that accounted for by Model 1 ($R^2 = 0.09$). Model 2 was not significant.

Table 5.8

Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Work Engagement at 19-month Follow-Up (n = 74)

Variable	Model 1		β	Model 2		β
	<i>B</i>	SE <i>B</i>		<i>B</i>	SE <i>B</i>	
Model 1						
Age	.26	.11*	.26*	.24*	.11*	.25*
Gender	-.03	1.66	-.00	.43	1.69	.03
Model 2						
WAS				.13	.10	.15
R ²	.07			.09		
R ² adj.	.04			.05		
F for change in R ²	2.60			1.62		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R^2 , explained variance; R^2 adj., adjusted explained variance.

Prediction of Job Satisfaction. The first regression analysis examined the relationship between the short work ability index (WAI) and job satisfaction at follow-up (Table 5.9). The covariates (gender, age) explained 5% of the variance (2% adjusted) in job satisfaction at follow-up (Model 1). Model 1 was not significant. The addition of the WAI (Model 2) explained a further 8% of the variance (8% adjusted) over and above that accounted for by Model 1 ($R^2 = 0.13$). Model 2 was significant ($p < 0.01$).

Table 5.9

Study 4 Hierarchical Regression Analyses for Work Ability (WAI) Predicting Job Satisfaction at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	.02*	.01*	.21*	.03	.01	.22
Gender	.07	1.20	.04	.14	.19	.08
Model 2						
WAI				.04	.02	.30
R ²	.05			.13		
R ² adj.	.02			.10		
F for change in R ²	1.71			7.07		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; R² adj., adjusted explained variance.

The second regression analysis examined the relationship between the single item measure of work ability (WAS) and job satisfaction at follow-up (Table 5.10). The covariates (gender, age) explained 5% of the variance (2% adjusted) in job satisfaction at follow-up (Model 1). Model 1 was not significant. The addition of the WAS (Model 2) explained a further 1% of the variance (0% adjusted) over and above that accounted for by Model 1 (R² = 0.06). Model 2 was not significant.

Table 5.10

Study 4 Hierarchical Regression Analyses for Work Ability (WAS) Predicting Job Satisfaction at 19-month Follow-Up (n = 74)

Variable	Model 1			Model 2		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
Model 1						
Age	.02	.01	.21	.02	.01	.20
Gender	.07	.20	.04	.11	.20	.06
Model 2						
WAS				.01	.01	.12
R ²	.05			.06		
R ² adj.	.02			.02		
F for change in R ²	1.71			.952		

* $p < .05$, ** $p < .01$, *** $p < .001$.

B, unstandardised regression coefficient; SE *B*, standard error of unstandardised regression coefficient; β , standardised beta coefficient; R², explained variance; R² adj., adjusted explained variance.

The findings indicate that the WAI was a better predictor than the WAS for each of the dependent variables; psychological distress, job stress, job satisfaction, work engagement, and sickness absence. Table 5.11 summarises the differences in variance between WAS and WAI from the longitudinal hierarchical regression analyses described in this prospective study. The table shows, for instance, that whereas the WAI explained 15% of the additional variance in psychological distress over and above the covariates, by contrast the WAS explained only 2%.

Table 5.11

Study 4 Overview of WAS and WAI Variance Differences

Variable	Covariates (age, gender)	WAI	WAS
Psychological distress	7%	15%	2%
Job stress	2%	4%	1%
Job satisfaction	5%	8%	1%
Work engagement	7%	9%	2%
Sickness absence	5%	3%	-

5.6 Discussion**5.6.1 Summary of findings**

At baseline (Study 2, Chapter 3) both the short 14 disease item Work Ability Index (WAI) and the single item Work Ability Scale (WAS) were administered. This provided an opportunity to assess the relative predictive validity of the two instruments by considering each in relation to a set of outcome variables that were assessed at 19-month follow-up (Study 3). Such was the focus of the analyses presented in the current chapter. The findings indicated that the WAI was a better predictor than the WAS for each of the dependent variables: psychological distress, job stress, job satisfaction, work engagement and sickness absence.

5.6.2 Findings compared to previous studies

The benefits of using single item questions in practice are argued by authors such as Bowling (2005), especially in situations where the participants are vulnerable, time is short and cost effectiveness and easy interpretation by the professional is a priority. While the use of the WAS has gained popularity in work ability research, there is a lack of longitudinal and comparative research on the use of both the WAS and WAI.

Ahlstrom et al. (2010) reports that the WAS is a good alternative to the WAI for assessing the status and progress of work ability among sick-listed female human service

workers in a three-wave longitudinal study, despite the higher variance in WAI results. A prospective two wave study among workers in the food industry used WAS as an outcome variable but acknowledges that the effects of not measuring chronic illnesses, as measured in the WAI, was a weakness of the study (Neupane et al., 2011). This is in contrast to a two wave study investigating occupational asthma and workplace environmental factors where all participants had clinical investigations alongside self-reported questions which included WAS (Vuokko et al., 2015). Health related factors – fatigue, anxiety, and depression – were the most strongly associated with WAS in a study examining work ability and long term breast survivors (Carlsen et al., 2013). Finally, a study examining work ability and occupational characteristics of firefighters also measured chronic disease separately because of the weight the WAI score gives to the diagnoses of diseases in addition to using the WAS for measurement of work ability (Plat et al., 2012).

While there is generally a lack of research on the comparative use of WAI and WAS, 5 studies have compared the two. El Fassi et al. (2013) used an occupational health data base to analyse work ability levels and various health status of the employees who attended the occupational health service over a 4-year period. This included information on diseases recorded by an occupational health physician. The findings demonstrated that the level of convergent validity observed between WAS and WAI was quite satisfactory and WAS therefore appears to be a tool to be used in the context of medical examinations performed within the field of occupational health care. In contrast, a prospective cohort study among construction workers measuring both WAI and WAS in relation to disability risk predictions found that the ability of WAS to identify construction workers at increased risk of disability pension was poor (Roelen et al., 2014). Both the WAI and WAS predicted disability pension in an investigation among municipal employee using register-based data although, similar to Roelen et al. (2014), the WAI was somewhat better (Jääskeläinen et al., 2016). This was also

the case in the prediction of long term sickness absence (LTSA) where the WAI was found to have superior predictive validity to individual items (Lundin et al., 2017). What is not clear from the Roelen et al. (2014) study was whether diseases were recorded as part of the 'health checks' described in the paper which could account for the higher calibration and discrimination variance in the WAI as demonstrated in Neupane et al. (2011) and Plat et al. (2012).

The third comparative study estimated logistic regression coefficients for the complete WAI, a shortened WAI without the list of diseases, and a single item work ability score for workers at risk of future long term sickness absence (Schouten et al., 2015). The results concluded that risk predictions and discrimination by the shortened WAI without the list of diseases was as good as the complete WAI, but the WAS showed poor discrimination in manual and non-manual workers. Moreover, Schouten et al. (2015) also reported that exclusion of the list of diseases from the WAI reduced information on the causes of a low work ability, so the opportunity to consult with occupational health and other experts should be offered if a shortened WAI, without the list of diseases, was used to identify Long Term Sickness Absence (LTSA) risk scores.

Whitehead and Bergeman (2013) demonstrated that both valence and arousal components of affect are important to consider when it comes to investigating health bias, and that these health bias effects operate to some degree within an everyday, non-clinical context for the general population of adults. In addition there could also be cognitive bias when an individual daily evaluates their health, even in the absence of a defining diagnosis or symptoms, because of the variability in daily negative or positive emotions. Whitehead and Bergeman (2013) also suggest that the use of a single item asking about health satisfaction as a measure is more confounded than it would be in the more specific context in which an objective health measure is used, such as a clinical health assessment. Their findings

therefore add weight to the inclusion of the use of a measure of chronic health conditions and diagnosis to strengthen the day-level objective health variable when asking about health satisfaction as a measure of subjective health. This study is the first investigation to examine the use of WAS and WAI in relation to individual and organisational indices. Direct comparison to previous studies is therefore not possible. However, the WAS findings closely mirror those of Jääskeläinen et al. (2016), Lundin et al. (2017), and Roelen et al. (2014) in demonstrating that the WAI was a far better predictor than the WAS of the dependent variables assessed.

5.6.3 Implications of the current study

The WAS is gaining popularity as a measurement instrument in work ability research. Ahlstrom et al. (2010) is referenced in six papers (Carlsen et al., 2013; Harju et al., 2014; Kuijer et al., 2012; Lundmark et al., 2017; Neupane et al., 2011; Plat et al., 2012) as the justification for using the WAS. This present study is more aligned to the findings of Jääskeläinen et al. (2016), Lundin et al. (2017), and Roelen et al. (2014) and as a consequence will contribute to the evidence base on decision-making in relation to use of the WAS versus the WAI in future research.

Disease-based questions cover 51% of the WAI and could be argued that for the assessment of work ability it is an important element to include to increase the content validity of WAI in comparison to the use of WAS as a single item measure to demonstrate a more accurate outcome. However, it has also been argued that, in practice, the use of WAS is preferable because of the WAI being difficult to interpret, calculate the index and from the worker perspective there can be difficulties understanding the questions leading to missing values (El Fassi et al., 2013; Jääskeläinen et al., 2016). This last point has the support of Reilly et al. (2009) whose study led to the conclusion that, for users, the WAI instrument was too technical, personal, irrelevant, and vague.

Questions remain on whether combining the WAS and disease-based screening is an advantage for improving quality in occupational health care, as suggested by El Fassi et al. (2013). Alternatively, it has been suggested WAS could be considered as a primary screening instrument and then the WAI distributed to existing workers with a low WAS score as a low cost option to a more targeted study (Roelen et al., 2014). Lundin et al. (2017) supports the use of three items for use in general public health surveys to predict LTSA. Using the WAS as a baseline for new employees could be another practical option, as part of the recruitment process, and in particular could be implemented into existing physical occupational health medical surveillance for new employees in certain occupations. The advantage of a baseline approach has been highlighted by Spector and Pindek (2015) for two reasons: 1) as part of a design strategy to determine temporal sequence and temporal lag which is helpful in better determining effects, and 2) the use of other multidisciplinary measures to assess physical responses to the psychosocial work environment and exposure.

As identified in Study 1 (Chapter 2) current Finnish occupational health practice WAI results are used for a variety of uses; primarily for individual case management, understanding population health trends, health promotion, and determining work ability across age groups. In addition, factors influencing use of work ability in Finland included it being considered common practice and an effective system by which to conduct individual assessments (Coomer & Houdmont, 2013). By replacing the WAI with WAS or any other modified WAI, it is therefore important to consider whether important information is lost which is essential to informing decisions on an individual employment and strategic level.

5.6.4 Limitations of the current study

The limitations within this study are similar to those of Study 3 because of the use of the same longitudinal sample of 74 employees. The main issues related to limitations include; a small sample size although as demonstrated in 5.4.4 a minimum sample size of 77 was

required suggesting that while the study may have been underpowered (Maxwell, 2004) it was very close to the recommended sample size. The sample also solely comprised of employees working in the manufacturing sector so it is not clear if the findings can be generalised to other sector employees.

Self-report measures were used and so the argument regarding whether the results over estimate the associations among variables because of common method variance needs to be considered.

5.6.5 Conclusion

The main focus of this study was to prospectively compare the WAI and WAS in terms of the prediction of individual health (job satisfaction, psychological distress, job stress) and organisational effectiveness (sickness absence, work engagement). Despite the methodological limitations of this study, the findings demonstrate that the short 14 disease item WAI performed better than the single item WAS.

Recent work ability research has increasingly used WAS as a measure because of simplicity, cost, and ease of interpretation than that of the WAI (Ahlstrom et al., 2010; Carlsen et al., 2013; El Fassi et al., 2013; Harju et al., 2014; Kuijer et al., 2012; Lundmark et al., 2017; Neupane et al., 2011; Plat et al., 2012; Spanier et al., 2014; Vuokko et al., 2015). However, this needs to be balanced with the contribution of data that a more comprehensive WAI measure could provide in which to inform practice to improve and maintain work ability. As a result of the growing popularity of the use of WAS further research on the validity of WAS in different occupational sectors and work environments would be beneficial. In the use of occupational health interventions, it would add to future evidence-based practice and, in particular, be of benefit when ethical reasons and/or time constraints prevent the use of the WAI. Ethical and legal considerations are discussed in more depth in Chapter 6.

Chapter Six: Discussion and conclusion

This final chapter brings together the results and conclusions from the preceding chapters, which are examined in relation to the wider debates taking place within public health, occupational health theory, and practice. First, an overview of the aims and the results of Study 1 are presented. Second, the different variables in relation to work ability examined in Study 2 and 3 are discussed and an overview of the research presented. Third, the results of Study 4 are summarised and ethical considerations examined for work ability and the use of personality constructs. Fourth, the practical and theoretical implications for occupational health practice are discussed within the context of current public health approach, changes in work motivation theory, demographics, and macro structures, such as political differences and economic viability on work ability. Fifth, the limitations of the work in this thesis are outlined and, finally directions for future research are proposed.

6.1 Introduction

The aim of this thesis has been to understand the context in which work ability is understood and used within occupational health practice (Study 1); examine relationships between work ability (WA) and individual indices (psychological distress, job stress, job satisfaction) and organisational effectiveness (work engagement, sickness absence). A secondary aim has been to examine the extent to which personality constructs – core self-evaluation (CSE) and the Big Five – might account for additional variance in these indices over and above that accounted for by work ability (Studies 2 and 3); finally, to compare two WA instruments to inform the evidence for utility of use within a practice setting (Study 4).

6.1.1 Rationale of work ability

The background and critique of work ability has been previously discussed in 1.4.1 and 3.4.6 the conclusion was that the Finnish concept of work ability and the associated measure of the WAI was selected for a number of reasons: 1) the WAI was developed for use

by occupational health services and therefore has value and application beyond the research context, 2) the validity and reliability of the tool has been tested and considered to be acceptable for occupational health research and practice, 3) it is an internationally recognised tool and consequently a broad empirical base has developed over the last 30 years. As previously stated, work ability (WA) is a comprehensive conceptual approach which reflects the interaction between an individual's human resources and work factors (Ilmarinen et al., 2005). A validated measure called the Work Ability Index (WAI) has been developed which consists of seven subscales; human resources can be described by (1) health and functional capacities (physical, mental, social), (2) education and competence, (3) values and attitudes, and (4) motivation. When this comprehensive set of individual factors is related to (5) work demands (physical, mental), (6) work community and management, and (7) work environment, the outcome can be conceptualised as the individual's work ability (Ilmarinen, 2001).

6.1.2 Rationale for inclusion of the Big Five and Core Self Evaluation

In light of the evidence for the importance of personality alongside work characteristics in the determination of health and wellbeing outcomes, it is not surprising that occupational health researchers often include measures of personality in their studies. Accordingly, in the current study the decision was taken to supplement the primary predictor (independent) variable – work ability – with a secondary predictor – personality. In this way, it was possible to examine the contribution of personality, over and above that of work ability, to explaining variance in the outcome variables.

In terms of methodology, the use of the Big Five or Five-Factor Model of Personality (i.e., neuroticism, conscientiousness, extraversion, agreeableness, and openness to experience) has been the dominant measurement of personality in organisational behaviour (Kovaleva et al., 2013; Naseer, 2012; Stumpp, 2010). For example, a Dutch cross-sectional

study examined whether burnout and work engagement could have been differentiated on the basis of personality and temperament and found that burnout was primarily related to neuroticism but not supported by low scores of extraversion (Langelaan et al., 2006). Several researchers have demonstrated the correlation between the Big Five personality factors and job satisfaction. In a study of employees working in the retail, manufacturing, and healthcare sector ($n = 202$), Furnham et al. (2009) demonstrated a significant correlation between conscientiousness and job satisfaction. This finding is consistent with a meta-analysis indicating conscientiousness and neuroticism as the strongest correlates with job satisfaction (Judge et al., 2002).

However, it can be argued that the Big Five approach is excessively narrow, and fails to take into account broader personality factors that have been linked to psychological health outcomes such as self-efficacy, self-esteem, and emotional stability (Judge et al., 1998). Additionally, some authors have argued against the rigid adherence to the Big Five model in organisational research (Borman, 2004) and for use of other personality constructs besides the Big Five model (Hurtz & Donovan, 2000; Grant & Wrzesniewski, 2010). Moreover, it is said that the problem of combining non-equivalent Big Five scales for meta-analysis can lead to dubious or mistaken classification (Steel, Schmidt, & Shultz, 2008) an issue also identified by Zillig et al. (2002) because of the varied length, format, theoretical origin, and use of the popular Big Five inventories. This has led to encouragement for more research on higher-order personality constructs (Luthans, 2002; Mäkikangas et al., 2013) and measures that could lead to better understanding and more effective interventions in job performance (Schmitt, 2004). For this reason, in addition to exploring the contribution of the Big Five personality factors, an additional broad personality construct – core self-evaluation – was included in Studies 2 and 3. This allowed for examination of the contribution of a

wide-ranging set of personality factors over and above that accounted for by the Big Five to the determination of health and wellbeing outcomes.

Core self-evaluation is an emerging broad personality concept indicated by four traits: Self-esteem, locus of control, neuroticism, and generalised self-efficacy (Judge, van Vianen & Pater, 2004). It has been termed a unifying theory that explains and predicts dispositional effects on indices such as job satisfaction and performance (Johnson, Rosen, & Levy, 2008). A growing field of research has therefore emerged in examining the validity of and reliability of the instrument (Chang et al., 2012; Chen, 2011; Stumpp et al., 2010), indices such as workplace wellbeing (Abikoye, 2007), job satisfaction, and performance (Bono & Judge, 2003; Lemelle & Scielzo, 2012), job stress (Brunborg, 2008), and job engagement (Lee & Ok, 2015). A more detailed explanation of core self-evaluation is found in 1.5.3.

The inclusion of core self-evaluation as a supplement to the Big Five represents an innovative contribution to the scientific knowledge base for a number of reasons. Firstly, as Study 2 demonstrates, core self-evaluation explains variance in some health and wellbeing outcomes over and above that accounted for by the Big Five personality factors contributing to the evidence base to support the widespread application of this broader personality construct in occupational health research. Essentially, it has demonstrated that the Big Five personality factors fail to fully capture the range of personality factors that contribute to the determination of workplace health and wellbeing outcomes. Secondly, if the core self-evaluation literature continues to make a unique contribution to specific health and wellbeing outcomes, this is interesting from an interventionist standpoint because it might be the case that the dimensions of core self-evaluation are more receptive to modification than the Big Five personality factors. In other words, whereas a Big Five personality factor, such as neuroticism, might be difficult to modify in the occupational health practice context, it might

be the case that through appropriate intervention, core self-evaluation factors might be receptive to change, potentially resulting in positive health and wellbeing outcomes.

While previous research has shown relationships between personality traits and various adverse psychosocial job outcomes, no published studies have looked at the joint contribution of work ability, CSE, and the Big Five to individual and organisational health indices. In a review by van den Berg et al. (2008) health, functional capacity, and work were (over) represented in work ability research. The influence of competence and values, attitudes, and motivation on health-related performance at work was found to be lagging behind. As the world of work is now characterised by ever changing dynamic environments, a consequent human resource of adaptability, flexibility, versatility, and a tolerance of uncertainty is in demand. If the human resources of work ability is also characterised by values, beliefs, and motivation then it makes empirical sense to examine the effect individual differences can bring to the paradigm of such a construct.

Four studies were undertaken. Study 1 (Chapter 2) examines the extent to which the work ability construct is understood and integrated into United Kingdom (UK) and Finnish occupational health practice. This is then followed by Study 2 (Chapter 3), a cross-sectional sample of the manufacturing sector to demonstrate whether there is a relationship between psychological distress, job stress, job satisfaction, and the organisational constructs of work engagement and sickness absence. The broad construct of personality is also examined in relation to work ability with an aim to contribute to a limited literature base on psychological influences that contribute to work ability and the use of core self-evaluation and the Big Five in the work ability construct. Study 3 (Chapter 4) presents a further study that employed a longitudinal design to examination of the relationship between Time 1 predictors and Time 2 outcomes over a 19-month time lag. Finally, Study 4 (Chapter 5) concludes the investigation by prospectively comparing the short and single version of the WAI.

6.2 Summary of results from Study 1

Aims of the study:

- 1) To establish the degree of knowledge, understanding and use of the work ability in OH practice in the UK.
- 2) Identify factors that influence the use of WA in Finnish OH practice.

This study was motivated by the paucity of evidence on the use of work ability within UK occupational health practice. This is despite anecdotal evidence suggesting that OH professionals in the UK have an interest in using WA in response to its increasingly widespread use in OH research, the practice implications from OH practitioners in Finland, and the challenges presented in health management by an ageing workforce. The findings indicated that knowledge and understanding of the WA concept was high and use of the WAI was viewed as common practice among responding Finnish OH professionals; in contrast, only 39% of UK respondents knew of the WAI and even fewer (3%) had used it. Lack of training was viewed by UK respondents as a barrier to the expanded use of WA and the WAI in UK OH practice. Finnish respondents indicated a number of factors influencing use of the WAI in OH practice which included at primary level the identification of organisational trends which then inform organisational policy and procedure and future workforce planning. At secondary level, it was used for individual health checks, rehabilitation, disability assessment, and health promotion. Eighty-five percent of the Finnish sample indicated that the most frequent source of knowledge of the WAI was using it in their organisations. This contrasted markedly with the UK sample as only two percent indicated that they had seen it used in organisations; the main source of knowledge among UK respondents was peer reviewed papers published in journals (25%). Analyses between the Finnish and UK dataset concluded that there were statistically significant differences in the understanding and use of the WAI.

6.3 Discussion of results from Study 1

While this study did not seek possible factors underpinning disparities between UK and Finnish respondents, there is nonetheless some identified differences in the wider OH systems, both politically and in practice between the UK and Finland.

Occupational health in Finland is regarded as high priority and has been developed through social and democratic dialogue (Lehtinen & Rantanen, 2012). This is reflected in the effective integration between research, practice, and enabling legislation which requires employers to provide occupational health services; 90% of Finnish employees are covered by an occupational health service (Lehtinen & Rantanen, 2012). The promotion of work ability and health in the workplace is enshrined in Finnish national policy, through statements such as ‘maintaining work ability during ageing is our common goal’ appearing in the Occupational Health Care Act of 2002 and the Occupational Safety and Health Act of 2003 (Ilmarinen, 2011). The Finnish working-age population is under health surveillance for both public health and occupational health purposes. The occupational health services carry out specific health examinations of the working population, divided into the following categories according to the Occupational Health Care Act (2002):

- Pre-employment
- Special examinations for workers in hazardous jobs
- When returning to work after a long sick leave
- For the assessment of working ability
- After retirement from particularly hazardous jobs, e.g. asbestos work.

There is also research and advisory support in the form of the Finnish Institute of Occupational Health (FIOOSH) (Tuomi et al., 1998), training on the WAI and a National WAI database (Lehtinen & Rantanen, 2012). In Germany, the establishment of a German WAI network has also been established (Hasselhorn et al., 2005).

In the UK there is no legal requirement to provide occupational health provision, and it is therefore estimated that 70% of the UK workforce does not have access to occupational health services (FOM, 2010). Work ability, as defined by Ilmarinen (2001), is not promoted in UK national occupational health policy. In the UK, employers decide what services to purchase rather than having a national holistic policy or guidance. Consequently, work health management tends to be focused on measures to increase employee productivity rather than a more holistic concept of work ability and prevention of ill health. The advent of the recent Fit for Work Service is an example of a UK government initiative to reduce sickness absence through voluntary referrals to an occupational health professional via GP services (Department for Work & Pensions, 2015b). However, the findings of research among general practitioners (GPs) prior to implementation indicated that GPs were reluctant to refer patients who were not interested in a quick return to work and/or would resist a referral (Hillage, Brown, Shiels, & Gabbay, 2014). Individual motivational factors are therefore seen to play a part in the success of the scheme.

In summary, the widespread use of the work ability approach in Finland has been multifactorial; public policy, longitudinal research, under the umbrella of the Finnish Institute of Occupational Health, engagement with companies and practical guidance, training, and support (Ilmarinen, 2011) have all contributed to its success and this is reflected in the results of Study 1. In the UK, Burdorf (2007) has suggested that economic evaluation will increasingly play a role in decisions about occupational health interventions. This is acknowledged by Ilmarinen (2009), who states ‘that there needs to be a better understanding of (i) what is the relationship between productivity and work ability and (ii) what interventions to promote work ability are cost effective in future work ability literature’. This approach will be of interest in countries that do not have a legislative framework for a holistic work ability model and, more recently, to researchers who have carried out studies on the

association of work ability and productivity (Karlsson, Busch, Aboagye, & Jensen, 2015; Leijten et al., 2014; Noone, MacKay, & Bohle, 2014). It is this area of work ability that is likely to be of interest to the development of an evidence-based business case which in a free market economy, such as the UK, will be crucial as a foundation for the expanded use of work ability among UK occupational health professionals.

6.4 Summary of results from Studies 2 and 3

Aims of Study 2:

- 1) Using a cross-sectional design, investigate the simultaneous relationship between work ability, personality, and individual indices (psychological distress, job stress, job satisfaction) and organisational effectiveness indices (work engagement, sickness absence).
- 2) Investigate the cross-sectional contribution of personality – core self-evaluation and the Big Five – in individual and organisational indices and the extent to which it may account for additional variance above and beyond work ability.

Aims of Study 3:

- 1) To investigate longitudinal relations between work ability and personality constructs in relation to worker health, wellbeing, and organisational effectiveness.

There was full support for the hypothesised relationships between work ability and the dependent variables of psychological distress, job stress, job satisfaction, work engagement, and sickness absence in Study 2. With the exception of sickness absence, there was full support for the hypothesised relationships between core self-evaluation, the Big Five and dependent variables of psychological distress, job stress, job satisfaction and work engagement. It can therefore be concluded that the vast majority of variance in all of the dependent variables was explained by work ability. Core self-evaluation and the Big Five provided significant explanatory value over and above that provided by work ability for each

dependent variable, with the exception of sickness absence for core self-evaluation and job satisfaction and sickness absence for the Big Five.

The longitudinal design of Study 3 allowed the relationships to be observed over time, and the regression results indicate that work ability, core self-evaluation, and the Big Five failed to explain a significant additional portion of the variance over and above that explained by the dependent variables of psychological distress, job stress, job satisfaction, work engagement, and sickness absence at Time 1. The hypothesis of whether normal causation was present in terms of the extent to which work ability and core self-evaluation contribute to, and predict, worker health, wellbeing, and organisational effectiveness over time was therefore not supported. The findings indicate that the variables were stable over time as a baseline measure so it can be concluded that the stability of relations between the independent (work ability), and dependent target variables (psychological distress, job stress, job satisfaction, work engagement, sickness absence) was supported. The results of the hypothesis testing from the cross-sectional (Study 2) and the longitudinal (Study 3) studies is summarised in Appendix D.

6.5 Discussion of results from Studies 2 and 3

The aim of this section is to discuss important findings from the cross-sectional and longitudinal studies and to highlight the theoretical and practical implications of these results. Each dependent variable will therefore be discussed in association with work ability, core self-evaluation, and the Big Five in addition an overview of research carried out in these particular areas presented.

6.5.1 The relationship between work ability, core self-evaluation, the Big Five, and psychological distress.

Findings from the cross-sectional and longitudinal studies of this investigation provided a firm indication that there is a moderate negative association between work ability and psychological distress which is stable over time.

Previous research has also indicated that psychological mood, whether assessed as depression or anxiety (Boschmann, van der Molen, Frings-Dresen, & Sluiter, 2014; Edlund et al., 2012; Fichera, Neri, & Costa, 2009; Guidi et al., 2012; Leijten et al., 2014; Leijon et al., 2017; Sjögren-Rönkä, Ojanen, Leskinen, Mustalampi, & Mälkiä, 2002) is a significant predictor of work ability. In a study among shift workers (Silva et al., 2012), the three items that were the most unfavourable using the GHQ-12 measure were difficulty maintaining focus on the job at hand, dissatisfaction with day-to-day activities, and not feeling useful in most day-to-day activities. There was a large negative association between core self-evaluation and psychological distress which is stable over time. Interestingly a study by Guidi et al. (2012) showed a high correlation between the WAI and General Health Questionnaire (GHQ); the GHQ was able to explain 47% of the variance in the WAI scores. In this thesis, the same association between work ability and psychological distress, using the GHQ, found 24%. Using a different methodology, Leijten et al. (2014) found that workers with chronic health problems had lower work ability at 1 year follow up with the greatest difference being those with a psychological health problem. More recently, Leijon et al. (2017) found that the presence of low support and the presence of psychological distress were associated with an increased probability of poor work ability among a large general working population with a self-assessed good work ability at baseline.

Work ability. This finding is unsurprising as it is estimated that two-thirds of lost productivity in the workplace is because of common mental health problems, which includes

sick leave, early retirement, and exclusion from the workplace because of discrimination linked to an individual's mental health status (Smit, Cuipers, Petrea, & McDaid, 2015). In addition, it is recognised that mental ill health is a fluctuating continuum and, to stay well, a combination of strategies is necessary to minimise the impact of common mental health problems at work when they occur (Irvine, 2011). At present, there is insufficient evidence about the effect of different therapies on work ability for employees with mental ill health problems. Knekt et al. (2008) conducted a randomised clinical trial comparing the effect of short term and long term psychotherapies on work ability and functioning. First, their results identified no differences in work ability between a short term psychodynamic psychotherapy and solution-focused therapy at any measurement occasion during the 3-year follow up. Secondly, the work ability improvement was much smaller than the changes in depressive and anxiety symptoms which was attributed to the requirement for a more profound process of improvement in one's self esteem and coping capacity to regain functional ability. Thirdly, out of a sample of 381, 55 patients decided to withdraw during the waiting time after assessment of eligibility to baseline examination. After randomisation, 32 patients refused to participate, and after starting treatment 42 patients discontinued the treatment prematurely. The major reason for the withdrawal and drop outs was disappointment with the treatment. It is acknowledged that, in particular, individuals discontinuing solution-based therapy had more symptoms than those completing treatment which may have biased the results. This finding perhaps emphasises the need for any treatment intervention on mental ill health to be appropriate to the morbidity of the population.

More generally a review on workplace interventions for people with common mental health problems found in favour of a cognitive behavioural approach for people already experiencing common mental health problems at work (Seymour & Grove, 2005) and this remains a current recommended approach by the National Institute for Health and Clinical

Excellence (Clark, 2011). In addition, among employees deemed to be at risk, either through their job role or who have been assessed as at risk, there was strong evidence from eight studies demonstrating that individual rather than organisational approaches to managing common mental health problems are most likely to be effective. The most effective programmes focused on personal support, individual social skills, and coping skills training (Seymour & Grove, 2005). More specifically, within work ability research, active coping skills has been found to influence work positively in contrast to avoidant coping styles which reduced work ability (van de Vijfeijke et al., 2013) and an early cognitive behavioural approach to was found to significantly increase work ability scores (Ojala et al., 2017). Appendix E - Table E1 summarises the research conducted on work ability and mental health.

Core Self-evaluation. CSE has been examined mostly within the organisational context (Judge et al., 1998; Judge et al., 2005). There is a lack of research on the validity aspects of the CSE with regard to psychological distress, e.g. anxiety and depression, but it has been suggested that the disposition of an individual can play a crucial role in psychological health (Abikoye & Sholarin, 2012; Galvin & Smith, 2015). Recently, attempts have been made to expand the exploratory potential and the implications of the CSE in other areas of human behaviour research. For example, Best et al. (2005) explored the role of CSE on burnout, a form of poor, work-related health. Their results demonstrated that CSE has a negative effect on burnout, suggesting the importance of CSE on health functioning. Additionally, Zenger et al. (2015) found that CSE is strongly related to measures of health status, anxiety, and depression and thus conclude that the CSE is not only a useful tool in research and personnel psychology, but also for screening purposes in the field of clinical and health psychology. Kammeyer-Mueller et al. (2009) conclude from their research that by understanding the coping strategies of those who are high in CSE, researchers might be better

able to design interventions to help those that are low in CSE cope more effectively. On a practical level, their suggestion of self-efficacy enhancement to reduce perceptions of stressors at work and manage the emotional reaction to stressors combined with the judicious use of emotion focused coping is worth consideration. This is partly because of the effectiveness of more traditional health promotion workplace interventions being questioned (Addley et al., 2014; Saltychev et al., 2013) and the recognition that psychological personal resources have a role in predicting work ability perceptions (McGonagle, Fisher, Barnes-Farrell, & Grosch, 2015). In addition there is also a view that health certainly affects, but does not entirely determine, a person's ability to work since many people work despite having some reduction of health (Sturesson et al., 2013; Tengland, 2011).

The Big Five. In terms of the Big Five traits, there are different schools of thought about affective wellbeing. The first is that there are independent associations between the Big Five traits, the second is that the relationships are complex rather than simple direct associations (Zhang & Tsingan, 2014). A review of the literature on the Big Five and psychological distress tends to agree with the latter view with extraversion and neuroticism being the two traits most associated with positive and negative mood (McCrae & Costa, 1991; Malouff, Thorsteinsson, & Schutte, 2005) and subjective wellbeing (Hotard, McFatter, McWhirter, & Stegall, 1989). For example, Zhang and Tsinggan (2014) found support in a study of Chinese students for the hypothesis that positive affect is predicted by extraversion and that negative affect is predicted by neuroticism. McCrae and Costa (1991) offer a temperamental view for these findings, in as much as extroverts are simply more cheerful and high-spirited than introverts, and individuals high in neuroticism are more prone to negative affect than those low in neuroticism. Di Sanza (2010) associates the extraversion trait as a driver for employees seeking help or support from supervisors in the workplace and similarly extroverts are also likely to enjoy social opportunities and pleasurable social interaction more

actively so personality and environmental influences on mood are confounded (Matthews et al., 2009, p 109). Successful psychological detachment from work has been associated with extraversion, agreeableness, and conscientiousness, whereas individuals high in openness to experience and neuroticism do not easily detach mentally from the workplace in non-working hours (Naseer et al., 2012). Previous research has associated lack of recovery time between working hours with contributory symptoms to psychological distress and an acute stress response (Geurts & Sonnentag, 2006; van Hooff, Geurts, Kompier, & Taris, 2007). However, emotional stability in the workplace can be influenced by capabilities and control over one's environment (Judge et al., 2004) as well as individual emotional regulation (Grandey, 2000) and presumably whether one is high or low on the neuroticism scale. Typical measures of neuroticism assess dysphoria, hostility, stress and anxiety (Judge et al., 2004) which has been criticised as overrepresenting dispositions that make individuals vulnerable to stress and strain rather than also assessing the more positive aspects of psychology such as resiliency factors such as locus of control, self-efficacy, self-esteem, and optimism (Mäkikangas et al., 2013). Studying the more positive variables may have practical implications for human resource development (Youssef & Luthans, 2007) such as the development of coping strategies (Galvin & Smith, 2015) strengthening certain personal characteristics by the use of personal goals and strategies (Mäkikangas et al., 2013) and other concepts such as the broaden and build theory (Fredrickson, 2004) and the COR theory (Hobfoll, 1989). Further discussion on the practical implications of these concepts is found in 6.10.

6.5.2 The relationship between work ability, core self-evaluation, the Big Five, and job stress.

Findings from the cross-sectional and longitudinal studies provided a firm indication that there is a moderate negative association between work ability, core self-evaluation, the Big Five, and job stress which is stable over time.

Stress in the workplace. The problem of stress in the workplace and its impact on the psychological and physical health of workers has been increasingly investigated (Guidi et al., 2012). Research efforts have focused on understanding the nature and the sources of work-related stress, its effects on workers' health, and on developing tools to identify and assess the risk of stress. A significant body of research (Cox, Griffiths, & Rial-González Cox, 2000; De Lange, Taris, Kompier, Houtman, & Bongers, 2004; Podsakoff, LePine, & LePine, 2007; Skakon, Nielsen, Borg, & Guzman, 2010) has shown a link between work characteristics and employee stress and wellbeing and whether this link is direct or indirect (i.e. mediated by individual or other factors). A large body of literature also suggests that work stress is closely related to anxiety and depression (Wang & Patten, 2001) and Tennant (2001) suggests that depression is the most likely adverse psychological outcome of exposure to work stress. As noted by Daniels (2011), this scientific evidence has found its way into policy at national and international level. The World Health Organisation, the International Labor Organisation, trade unions, and the European Union have emphasised the need to assess psychosocial risks emanating from working conditions (e.g. high work demands, repetitive tasks, work pace) and take preventive actions to tackle problems (International Labour Office, 2012; Leka, Jain, Iavicoli, Vartia, & Erte, 2011; Trade Union Congress [TUC], 2014). This fits in very well with the Work Ability model in the sense that it is related to the demands of the job.

During the 1990s, there was a significant increase in reports of work-related stress which prompted the authorities in the UK to tackle the problem (Stansfeld, 2008). It started with some initial awareness raising guidance, and culminated with the development, by the Health and Safety Executive (HSE), the national regulator for health and safety at work, of extensive and explicit guidance on stress risk assessment and management in 2004. These are known as the HSE Management Standards (Health & Safety Executive [HSE], 2007). The aim of the approach was to encourage employers and employees to work together to identify

psychosocial risks and adopt solutions to minimise these risks. Stress in this context is defined as ‘the adverse reaction people have to excessive pressures or other types of demand placed on them’ (HSE, 2007). The Management Standards refer to good management practice with regard to six main psychosocial risks in the workplace i.e. job demands, control, support from management and peers, relationships at work, clarity of role, and organisational change. It is now widely adopted in UK organisations within their risk management activities (Houdmont et al., 2012) but with the emphasis on estimating the risks and identifying the possible sources rather than measuring individual stress. This is an important point, as Main, Glozier, and Wright (2005) found, because while the HSE Management Standard filters were specific, they were insensitive and poor at detecting individuals with work-related stress. In a study using the WAI and the HSE Management Standards, low to moderate significant correlations were found between all the indicator tool subscales and the WAI. In addition it was found that control, role, and change were all associated with the WAI (Guidi et al., 2012). As already indicated in Study 2 and Study 3, psychological distress has been strongly associated with work ability and core self-evaluation using the GHQ, a summary of work ability research is thus presented in Appendix E - Table E2. While there is strong support for the importance of job characteristics and adequate job redesign on work ability (Prumper, Thewes, & Becker, 2011) is it also possible that employees with fewer mental health resources perceive a higher workload, and so appraisal of the stress cannot be ignored? As Smith, Brice, Collins, Matthews, and McNamara (2000) note in their study on occupational stress and the impact of demographic factors and type of job:

Job characteristics can increase perceived stress but greater reporting of stress is not an inevitable consequence in every person. Similarly, both job characteristics and perceived stress are related to ill-health but again there will be individuals who do not

show such associations. It may also be the case that different pathways are involved, with not all job health effects being mediated by an increase in stress' (p.59).

Additionally, Viotti et al. (2017) attempted to understand the role of work ability in the demand control model and found both job demand and resources significantly predicted exhaustion among older female kindergarten teachers with the confirmation that work ability was more associated with resources than demands. The authors (Viotti et al., 2017) conclude by suggesting that the results indicate that work ability, as a personal health-related resource, is often strongly associated with the variables involved in the motivational process of job resources which is more complex than previously posed in medical and psychological research and thus plays a key role in the stress process.

This raises the question of whether the original one-directional view of the demand control model is too narrow and as part of a risk assessment approach should individual characteristics on perception of stress be considered. As Table E2 demonstrates, there is a lack of longitudinal data in which cause and effect on work ability and job stress exists. However, in one such study, which examined the causal relationship between the demand control support measures and mental health, the results seemed to be consistent with the dynamic view in which work has effects on strain levels of the employee and the possibility that health indicators influence work characteristics (de Lange et al., 2004). In addition, they make the observation that change in the employee's evaluation of the same work environment (e.g. the person's perception of the same working conditions changes as a result of their mental health status). As a consequence, relatively unhealthy workers are apt to perceiving their work environment in an increasingly gloomy fashion and longitudinally reported higher job demands and lower levels of supervisor social support across time. A question therefore remains as to whether increased control in the workplace or other job design would make any difference to this perception or is it a question of understanding, in

the context of a biopsychosocial approach, the fundamental core self-evaluations that may be driving this perception and reinforcing negative behaviour? This concept will be explored in the next section.

Core self-evaluation. There have been few studies on the association between stress and CSE; the few that have been conducted did find that CSE is a strong predictor variable for job stress (Asgari, 2013; Brunborg, 2008). As demonstrated by the paucity of CSE and stress research, the main methodology has been by measuring separate measures of self-esteem, locus of control, generalised self-efficacy, and neuroticism. This means that the core self-evaluations trait must be extracted by factor analysing the four scales that indicate the trait (Judge, et al., 1998). A direct measure, because it is designed to precisely measure the underlying concept itself, rather than the indicators of the concept, may therefore be more valid and practical – this is the fundamental principle of the CSE instrument. However, the different singular personality traits cannot be discounted as they have been the basis for research and practice in work stress and psychology for many years and therefore warrant further explanation.

Locus of control. One such construct is locus of control: ‘One’s belief in one’s ability to control one’s environment’ (Bono & Judge, 2003). Internal locus of control is defined as an individual believing that he or she can control his or her own environment. External locus of control, on the other hand, describes an individual viewing his or her life as controlled by external forces (other people and events). According to Kahn and Byosiere (1992), locus of control should be included in job stress research, since individuals with internal locus of control are more likely to cope actively with job stress and show greater levels of health and wellbeing in comparison to individuals with external locus of control. Research has found that the job demand-control model (JD-C model) premise of job control as a moderating variable on job stress (Karasek, 1979) only worked for those with internal locus of control

(Daniels & Guppy, 1994). Furthermore, control had an adverse effect on those with external locus of control. The relationship between control and job stress may therefore be more complicated than initially assumed by Karasek (1979). This is an interesting concept because of the dominance of the demand-control model in tools such as the HSE Management Standards approach which is based on the premise that a combination of high job demands (workload) and low decision latitude (amount of control or decision-making power) causes mental strain that is detrimental to an employee's health and wellbeing. According to the hypothesis of the JD-C model, job stress can be reduced by giving more job control to workers in high demand jobs. However, Brunborg (2008) found that personality traits seem to influence this process as after controlling for social support and CSE, control had no significant effect on job stress.

Self-efficacy. Self-efficacy has been investigated in relation to job stress (Bandura, 1997). There are two forms of self-efficacy, specific and generalised. The first is task specific, whereas the other, generalised self-efficacy, is defined as "one's estimate of one's capabilities of performing, at a global level across many contexts" (Bono & Judge, 2003). Salanova et al. (2002) studied the effects of job demands, job control, and self-efficacy on burnout (measured by levels of exhaustion and cynicism). The results showed a three-way interaction effect of generalised self-efficacy, job demands, and job control on exhaustion. This indicates that high self-efficacy individuals should cope better with high job control, while low self-efficacy individuals will feel that high job control exacerbates job stress. It has also been suggested that internal locus of control might be better related to health and healthier behaviours in countries that favour high individualism, compared to countries high in collectivism (Luszczynska & Schwarzer, 2005). In the multicultural workplaces of today, the fact that national culture may play a moderating role therefore needs to be considered.

Self-esteem. Another trait that has received attention in relation to a vast array of psychological concepts is self-esteem. Self-esteem is an important psychological construct because it is a central component of an individual's daily experience; it refers to the way people feel about themselves. This can then reflect and affect ongoing transactions with their environment and the people they encounter in it (Kernis, 2008). In theory, it seems likely that a person who lacks self-approval and views himself or herself in a negative way will also be dissatisfied with his or her job. Research suggests that self-esteem may moderate the stress-illness relationship. There are two explanations for this (Rector & Roger, 1997). First, self-esteem may be a stable pattern of influence on a person's appraisal of threats and also in patterns of autonomic arousal (i.e. heartbeat and respiration). Individuals with high self-esteem may, thus, have a higher threshold for experiencing job stress compared to their low self-esteem counterparts. Second, self-esteem may play a role in coping with job stress, and hence, influence the likelihood of job stress turning into strain and health problems. It seems that individuals with low self-esteem are less likely to cope effectively with stress at work. For example, Moreland and Sweeney (1984) found that negative feedback on work tasks elicited a more negative affect in low self-esteem workers than in high self-esteem workers.

Neuroticism. Neuroticism is thought to be a broad dimension of personality whereby people vary in autonomic nervous system liability and in the tendency to focus on the most negative aspects of one's self (Pinder, 2008). There is a suggestion that, in some senses, high neuroticism in itself can be considered to be a form of stress proneness, as high neurotic individuals persistently worry and have feelings of inadequacy, tension, and nervousness which are unpleasant, stressful feelings (Matthews et al., 2009, p. 273). It has been proposed that an exposure-reactivity model can provide the best account of how neuroticism leads to distress in daily life and thus affect health and productivity outcomes (Bolger & Schilling, 1991). Bolger and Schilling (1991) found that neuroticism led to greater exposure and

reactivity to daily stressors and that, among the daily stressors, interpersonal conflicts with adults were the most important in explaining the neuroticism-distress relationship. However, their study did not explain why high neurotic participants showed greater reactivity to conflicts. One explanation could be that coping may play an important role. Bolger and Schilling (1999) examined this concept in their study and found that neuroticism leads to more confrontational coping when conflicts occur and because confrontive coping leads to depression for both high and non-neuroticism participants, neuroticism leads to greater depression following conflicts.

The Big Five. As discussed previously, the neuroticism trait has an empirical basis for predicting clinical mood, anxiety symptoms, and disorders (Malouff et al., 2005) and a vulnerability to stress (Bolger & Schilling, 1991; Schneider, 2004). In this current research, neuroticism (Study 2) and conscientiousness (Study 3) significantly contributed to the regression model examining job stress which perhaps highlights the point that although neuroticism is the predominate trait associated with stress exposure, the associated response is influenced by not one trait at a time, but by all of the personality at once (Carver & Connor-Smith, 2010). For example, persons with low conscientiousness presented a higher heart rate, indicating a physiological stress response, when exposed to a stressor (Brouwer, van Schaik, Korteling, van Erp, & Toet, 2015). This view is supported by previous research among managers which found high neuroticism and low conscientiousness predicted higher dysfunctional coping (Grant & Langan-Fox, 2006) and more recent research which found the presence of an anxiety or comorbid disorder among highly conscientiousness employees was almost three times more likely to result in long term absenteeism compared to highly conscientiousness employees without a current affective disorder (Kok, Plaiser, Smit, & Penninx, 2017). The combination of high neuroticism and high conscientiousness (measured as obsessiveness/compulsiveness) is considered to be a particularly high stress risk among

medical students because of an exceptionally demanding study load and the need to tolerate uncertainty well, a skill that can be assumed difficult to achieve for conscientious students (Tyssen et al., 2014). The researchers also found that the level of extroversion seemed to modify the effect of the combination of neuroticism and conscientiousness among the medical students (Tyssen et al., 2014). This finding supports the theory that extroversion correlates with a positive mood (McCrae & Costa, 1991; Zhang & Tsingan, 2014) and the combination of high conscientiousness and extroversion traits can be particularly effective in directing resources towards behaviours that facilitate goal achievement (Penney, David, & Witt, 2011). It appears that individuals who tend to engage in conscientious behaviors tend to experience less neurotic tendencies. This may be because of conscientiousness having a consistent protective effect, predicting less negative affect and low levels of anxiety and depression, and preventing individuals from feeling frustrated (Carver & Connor-Smith, 2010).

6.5.3 The relationship between work ability, core self-evaluation, the Big Five, and job satisfaction.

Findings from the cross-sectional and longitudinal studies provided a firm indication that there is a large association between work ability, personality, and job satisfaction which is stable over time.

Job satisfaction has been defined by Locke (1969) (Pinder, 2008) as ‘an emotional reaction that results from the perception that one’s job fulfills or allows the fulfillment of one’s important job values, providing and to the degree that those values are congruent with one’s needs’ (p. 271). While Locke (1976) did not speculate about the particular emotions involved, scientific progress has been made to discern whether there is a relationship between job satisfaction and health. Faragher, Cass, and Cooper (2005) report a meta-analysis of almost 500 studies of job satisfaction, incorporating more than 250 000 employees in a large

variety of different organisations based throughout the world. The largest combined statistical correlations found were between job satisfaction and measures of mental health; smaller relationships were detected for measures of physical health. They conclude that the meta-analysis findings indicate that, on average, employees with low levels of job satisfaction are most likely to experience emotional burn-out, to have reduced levels of self-esteem, and to have raised levels of both anxiety and depression.

As already indicated in this thesis the promotion of work ability is not only a result of health and functional capacity, but also involves other criteria such as work demand and work organisation (Tuomi et al., 1997). Many people spend a considerable proportion of their waking hours at work. If their work is failing to provide adequate personal satisfaction – or even causing actual dissatisfaction – it seems reasonable to hypothesise that such individuals are at increased risk of experiencing a lowering of general mood and feelings of self-worth while at work, culminating in mild levels of depression and/or anxiety. However, it remains unknown whether, for example, poor stress handling will decrease work ability or decreased work ability will cause poorer stress handling which consequently results in an effect on job satisfaction. In a study on shift workers in the electrical industry, the mental resources necessary to perform the work of the operators influenced job satisfaction and reduced work ability (Silva et al., 2012). However, within the work ability literature there is also an association between job satisfaction and job design (Lindfors et al., 2007; Silva et al., 2012). Marqueze and colleagues (2008) demonstrated this concept in an interventional study which identified a positive correlation between the psychosocial factors of job satisfaction and the work ability of educators; factors included volume of work, level of stability at work, recognition at work, and level of salary related to experience and responsibility. Following a restructure which aimed to minimise the number of sources that caused job dissatisfaction, work ability improved by 6.3%. An emotional reaction to whether one is fulfilled at work is

therefore more likely to be associated with primary level factors such as organisational culture and leadership. For example, previous research has shown that leadership behaviour and transformational leadership style are associated with reduced work stress (Laschinger, Wong, McMahon, & Kaufmann, 1999; Sosik & Godshalk, 2000). Previous findings also suggest that organisational cultures characterised by innovation, support for employees, and loyalty among colleagues, have higher proportions of satisfied staff who are generally less stressed in their work and who report a stronger desire to remain within the organisation (Joiner, 2001; Lund, 2003; Sheridan, 1992). An overview of work ability and job satisfaction is presented in Appendix E - Table E3.

A common assumption has been that employees who are more satisfied with their work tend to be more productive than those not as satisfied. It is suggested that this is not always the case, for example a dissatisfied employee will become quite productive if they perceive that high performance levels may help earn more, a promotion, or a chance to attain a job elsewhere (Pinder, 2008, p. 284). This observation has led to a renewed interest on whether an individual's personality would predict their average mood and in turn predict job satisfaction. The core self-evaluation literature provides insight into this concept.

Core self-evaluation. The studies that have investigated the relationship between core self-evaluations and job satisfaction have shown that there is a relationship between the two concepts (Judge & Bono, 2001) particularly highlighting the processes by which individuals with a positive self-regard are more satisfied with their jobs (Judge et al., 1998). More recently, researchers have investigated the effect of core self-evaluations on self-concordance and its consequences. Judge et al. (2005) demonstrated that people with positive core self-evaluations were especially good in demonstrating an adaptable ability to select self-concordant goals that represent their implicit interests, values, and growth needs, and were ultimately more satisfied with their jobs and lives in turn. On a wider, more holistic level, this

concept is important because goals that are ‘assigned’ by health professionals to others, for example losing weight and increasing exercise, could be cancelled out and be less satisfying by the fact that one was not fully and personally committed to such goals. Difficulties in self-regulation therefore occur if individuals fail to assess accurately their needs, values, and interests and pursue goals based on perceived external requirements and the needs of others.

As already discussed, core self-evaluations are basic conclusions or bottom line evaluations that individuals hold about themselves and their worthiness and capability (Judge et al., 1997). As such, this construct should be related to a personal satisfaction with life and in support of this argument, Judge et al. (1998) found that core self-evaluations were positively and significantly related to life satisfaction. In addition Heller, Judge, and Watson (2002) found evidence for the confounding role of personality in the relationship by the findings of considerable joint variance in job and life satisfaction using theoretically relevant affective personality constructs. The implication on the third floor of the work ability model (see figure 1.1) is therefore interesting as this broader reflection of job satisfaction and life satisfaction fits in very well with the idea that there is a ‘balcony’ effect that influences life outside of work and general wellbeing.

The Big Five. The Big Five have been linked to job satisfaction. In a sample of three qualified mathematical professionals, neuroticism had a significantly negative impact on job satisfaction (Cohrs et al., 2006). This reflects meta-analytical findings by Judge et al. (2002) where traits of neuroticism, extraversion, and conscientiousness displayed moderate correlations with job satisfaction and weaker correlations with agreeableness and openness. A significant correlation was also found in conscientiousness and job satisfaction in a study of employees in the retail, manufacturing, and healthcare sectors (Furnham et al., 2009) which was explained by the authors as individuals high in conscientiousness likely to be rewarded both extrinsically (in the form of bonuses and other perks) and intrinsically (in the form of

more responsibility and expanded job roles). In terms of certain careers and occupations, it makes sense that individuals select careers and jobs compatible with their personality dispositions which in turn will increase and maintain job satisfaction.

6.5.4 The relationship between work ability, core self-evaluation, the Big Five and work engagement

Findings from the cross-sectional and longitudinal studies provided a firm indication that there is a moderate positive association between work ability, core self-evaluation, and work engagement which is stable over time. Employee engagement can be summarised into three approaches.

1) According to Kahn (1990), engagement at work is the degree of physical, cognitive, and emotional involvement in a work role, how much a worker puts into a job and work interactions, and the personal connections with work and co-workers. Employees who exhibit engagement are physically involved in their tasks, are cognitively alert and attentive, and are emotionally connected to their work and to others in the workplace (Lee & Ok, 2015).

2) Maslach, Schaufeli, and Leiter (2001) conceptualised engagement as the opposite or the positive antithesis to the three burnout dimensions: Exhaustion, cynicism, and sense of inefficacy. Thus, low scores on exhaustion and cynicism and high scores on efficacy on the burnout scale indicate the three characteristics of job engagement: Energy, involvement, and efficacy. Thus, an engaged employee is energetic and positively connected with work activities and can handle the demands of the job.

3) Schaufeli Martinez, Pinto, Salanova, and Bakker (2002) provides a third approach for employee engagement, asserting that job engagement and burnout were independent states of mind inversely related to each other. They defined engagement as a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication, and

absorption. Vigour refers to the feeling of physical energy, emotional strength, willingness to invest effort, and endurance of difficulties. Dedication is characterised by a sense of significance, enthusiasm, inspiration, pride, and challenge. Finally, absorption refers to the state of being so completely concentrated and highly engrossed in work that an employee feels time passes quickly and has difficulties detaching from work (Schaufeli et al., 2002). It is this construct that was used as a work engagement measure in Study 2 and 3 of this present investigation.

In the context of motivation, work engagement has been of considerable interest and has resulted in employer-focused organisations producing guidance to motivate and engage with the workforce (Chartered Institute of Personnel and Development [CIPD], 2012; Advisory, Conciliation and Arbitration Service [ACAS], 2011) in the belief that highly engaged employees increase productivity (Rayton, Dodge, & D'Analeze, 2012) and are more healthy (CBI, 2014). Gould et al. (2008) found that a positive attitude towards work was related to good work ability. People with positive attitudes towards work experienced fewer limits to their work ability, and they estimated that they would be able to continue working in the same job for the next two years more often than those with negative attitudes. The relation between work attitudes and work ability was evident both with respect to cynicism towards work, which is characteristic of burnout, and with respect to positive motivational factors that are characteristic of work engagement, such as professional self-esteem. A complex interplay therefore seems to exist, where job and personal resources, positive emotions, work engagement, and positive job outcomes are all elements of a self-perpetuating, complex dynamic motivational process (Hakanen, Bakker, & Schaufeli, 2006; Salanova, Del Líbano, Llorens, & Schaufeli, 2014; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009).

However, despite the growing evidence on the positive consequences of work engagement and the evidence that when job resources are available for employees, they feel more able to deal with their work goals (i.e. they have personal resources), and therefore feel self-efficacious, valuable, and optimistic (Xanthopoulou et al., 2009), there is still scarce research between work engagement and work ability. Appendix E - Table E4 presents the research that has been conducted on this relationship.

Work engagement, personal resources, and work ability has received some attention more recently with the findings that employees' work ability may function as a health-related resource that may have beneficial effects on employee wellbeing in the long term (Airila et al., 2014; Hakanen et al., 2006). Mache et al. (2015) found that personal resources among physicians, such as resilience and self-efficacy, were positively associated with work ability and an increasing work engagement corresponds to a constant increase in work ability. This finding concurs with a study conducted among Dutch academic staff where three factors were found to be indicative of low absence. These were strong mental resources, enjoyment of work, and the belief that their strong work ability would continue (Schouteten, 2017).

Core self-evaluation. With regard to CSE research, Lee and Ok (2015) found a significant association with engagement in hotel employees. Additionally, the results of a longitudinal study found that work engagement related to both job and personal resources over time (Xanthopoulou et al., 2009). This finding is in line with Fredrickson's (2003) Broaden and Build theory which describes the form of positive emotions in terms of broadened thought–action repertoires, and describes their function in terms of building enduring personal resources. In doing so, the theory provides a new perspective on the evolved adaptive significance of positive emotions by demonstrating that that people who are in a positive affective state (i.e. work engagement) may build personal (i.e. self-efficacy, OBSE, optimism) and psychosocial (i.e. job) resources. Apparently, engaged employees do

not only feel good about themselves, but they also are best able to mobilise support from colleagues, receive feedback, and to create opportunities at work.

The Big Five – There is generally a lack of research examining the association of work engagement and personality (Seppala et al., 2009). However, previous research has used the individual personality variables of neuroticism, extraversion, and conscientiousness to predict work engagement (Inceoglu & Warr, 2011; Kim, Shin, & Swanger, 2009; Langelaan et al., 2006). Langelaan et al. (2006) demonstrated that burned-out and engaged employees can be distinguished from their counterparts on the basis of their personality and temperament. Results showed that high neuroticism is the core characteristic of burnout, whereas work engagement is characterised by low neuroticism in combination with high extraversion and high levels of mobility; engaged employees adapt quickly to changes in their environment, and pass easily from one activity to the other compared to their counterparts. This ability to proactively adapt and optimise work environments has gained interest and popularity in employee job crafting (Nielsen et al., 2017) which is defined as the physical and cognitive changes individuals make to their task or relational boundaries (Bakker, Tims, & Derks, 2012). Work engagement has therefore been shown to be enhanced by the proactive role employees play in actively shaping and influencing their work environment (Bakker et al., 2012; Tims, Bakker, Derks, & van Rhenen, 2013). Moreover, a proactive personality explains variance over and above that accounted for by the Big Five personality factors (Bakker et al., 2012).

6.5.5 The relationship between work ability, core self-evaluation, the Big Five, and sickness absence

Findings from the cross-sectional and longitudinal studies provided a weak negative association with absence which remained stable over time for work ability. In this current study, CSE did not explain additional variance in the dependent variable of sickness absence,

this is in contrast to all other variables studied – psychological distress, job stress, job satisfaction and work engagement – where additional variance of CSE above that of work ability was demonstrated.

Health is naturally associated with sickness absence, and global measures such as self-reported health have been demonstrated as predictors of sickness absence in previous studies, particularly absence longer than seven days (Marmot et al., 1995). Longer periods of sickness absence, where it is based on a physician's examination rather than self-evaluation, is seen as an adequate health indicator (Kivimäki et al., 2003). Conversely, an alternative view of sickness absence, as an indicator, emphasises the variable relation between illness and absence. Employees may take sick leave without actual illness or have illness without taking sick leave. While it is acknowledged that short term absence is generally easier to manage than longer term absence (Bevan, 2003) occupational health involvement is most commonly ranked among organisations' most effective methods for managing long term absence (CIPD, 2015). This is likely to be a proportion of the workforce which was demonstrated by Labriola et al. (2006) in a Norwegian study where 20% of the work population accounted for 80% of the total amount of self-reported days of sickness absence from work. Sickness absence in the UK has also become a national concern (Black, 2008) as the health and wellbeing of the UK workforce becomes critical to labour productivity and organisational performance. Indeed, the recent fitness to work service is an example of a national policy designed to reduce sickness absence with voluntary referrals by GPs, after four weeks' sick leave, to discuss and implement a return to work plan (Department for Work & Health, 2015b). Previous absences and previous ill health have been found to be strong predictors of sickness absence (Judge et al., 1997; Roelen et al., 2011) and work ability research and practice has explored the utility of the WAI to predict sickness absence.

For example, in Study 1 of this current investigation, 46% of the Finnish OH practitioners surveyed reported that they used the WAI scores to predict sickness absence. Previous research is supportive of the validity of this approach (Ahlstrom et al., 2010; Kujala et al., 2006; Lundin, Kjellberg, Leijon, Punnett, & Hemmingsson, 2015; Lundin et al., 2017; Meyer, Niedermann, Tschopp, & Klipstein, 2013; Notenbomer, Groothoff, van Rhenen, & Roelen, 2015; Schouten et al., 2015; Schouteten, 2017) and it is perhaps not surprising as the health-related dimensions in the work ability index have a large influence on the work ability score (Gould et al., 2008). While Schouten et al. (2015) found that the WAI without a list of diseases could predict workers with an increased risk of LTSA, the influence of diagnosed diseases and functional limitations have been found to be a major factor in work ability (Ahlstrom et al., 2010; Schouteten, 2017). This is confirmed by a more recent prospective study where the risk of LTSA was estimated in relation to the number of chronic diseases and good or poor work ability (Sundstrup, Jakobsen, Mortensen, & Anderson, 2017); the authors found that depression, cancer, and back disorders were significant predictors for LTSA. It is then perhaps self-evident that physical weakness, functional impairments, and disabilities render people unable to work. However, as Allebeck and Mastekaasa (2004) argue, the medical explanatory models are insufficient when it comes to explaining sick leave for a given disease in an individual. The growing psychological, and social factors which influence sickness absence should also be considered.

Management of work-related disability and absence because of illness is a priority of occupational health professionals (Ballard & Ghani, 2015), but it is reported that the focus of physicians should shift from a strictly disease-orientated approach to identify factors that hinder recovery and encourage work resumption to non-medical factors (Dekkers-Sánchez, Wind, Sluiter, & Frings-Dresen, 2013). On a broader level, this reflects previous calls for a biopsychological approach to healthcare (Engle, 1977) and more recently to vocational

rehabilitation (Lunt, 2007; Waddell, Burton, & Kendall, 2008) particularly as the probability of return to work from sickness absence decreases significantly after four months of absence (Andren, 2001). Macro changes in policy have already been implemented in the UK with the Fit for Work scheme and fit note (Department of Work & Pensions, 2015b). This has attracted interest in countries such as Finland, who have implemented legislation to reduce sickness absence which incorporates early notification of long term absence to occupational health professionals and consequent assessment of work ability (Halonen et al., 2016). While the researchers compare the Finnish scheme to the UK Fit for Work scheme, it is not clear whether the Finnish scheme is compulsory rather than on a voluntary basis like the UK scheme. However, what is of interest is the incorporation of work ability assessment in the decisions regarding adjustments and modifications to work; this could be of considerable interest to practitioners in the UK if further research demonstrates an increase in work participation. This is demonstrated by the findings of a Dutch study which posited that academic staff were less likely to report absence than non-academic staff because of the difference in job functions and, more specifically, the ability of academic staff to work flexibly e.g. from home, and adopt adjustments more readily to their job function than non-academic staff (Schouteten, 2017). Appendix E - Table E5 presents the research conducted using work ability as a measure.

In work and organisational psychology, there is a longstanding dispositional-situational controversy. The dispositional approach proposes that individuals possess stable traits that significantly influence their affective and behavioural reactions to organisational settings (Davis-Blake & Pfeffer, 1989). Individual differences in personality traits are considered to be extremely stable in adults, even over periods of as long as three decades, during which most people will have experienced major life changes (McCrae, 2002). Others questioned the importance of dispositions and took a situational perspective for explaining

(differences in) organisational behaviour. The situational approach proposes that individuals are highly responsive and adaptive to organisational settings, and that personality traits change in response to organisational settings (Davis-Blake & Pfeffer, 1989). McCrae (2002), however, noted that personality changes associated with environmental influences are difficult to assess because of ambiguity of the causal direction, small sample-sizes, and the lack of replication of the findings. This view concurs with the findings in Study 3.

There is limited evidence on the dispositional basis of absenteeism and the relationship between personality and the construct of absence. As previously described, there is empirical evidence to suggest that a strong predictor is historical sickness absence and illness, but the question of whether the role of personality influences past and predicts future absence is limited as absence has received little attention as a subject of investigation within the CSE construct. One such study (Liu et al., 2015) found that CSE buffered the positive relationship between self-reported conflict and employee's absence, as well as the positive relationships between co-worker-reported conflict and absence/lateness. Generally speaking, interpersonal conflict positively related to absence and lateness for employees low in CSE but not for employees high in CSE.

The Big Five. For a broader examination, one needs to consider specific personality traits in relation to absence. For example Taylor (1968) found in a study on 194 men in a refinery that the attitudes of the men towards themselves, their work, and their health were the most important factors of all as to whether they would take absence from work. There was a strong correlation with a high extroversion score and the frequently sick group and a higher neuroticism score in the long sick group which was implied as secondary to long term absence rather than the cause. Interestingly, 28% of the never sick group had the same proportion of medical abnormalities as the frequently sick and control group. Almost 30 years later, Judge et al. (1997), using the Big Five traits (Costa & McCrae, 1995), hypothesised that

neuroticism and extraversion would be positively related to absence and negatively related to conscientiousness. Owing to the lack of theoretical or empirical basis for the relationship of openness and agreeableness to absence, there was a null expectation with respect to these two facets of the five factor model tested. Neuroticism refers generally to a lack of positive psychological adjustment and emotional stability. Persons scoring high on measures of neuroticism are frequently characterised as fearful, anxious, and depressed. Extraversion can be broadly construed as sociability. Extroverts are more talkative, active, and assertive than their introverted counterparts. Furthermore, extraversion is typically characterised by gregariousness and excitement-seeking behaviour. Extroverts are highly social. Conscientiousness is characterised by personal competence, dutifulness, self-discipline, and deliberation and are frequently described as purposeful, strong-willed, determined, punctual, and reliable (Judge, Martocchio, & Thoresen, 1997). The findings of Judge et al. (1997) demonstrated that neuroticism did not predict absence, however extraversion was moderately positively predicted and conscientiousness moderately negatively predicted. In addition, 45% of the relationship between extraversion and absence was mediated by absence history. Both Taylor (1968) and Judge et al. (1997) conclude that extraverts could be less satisfied if the nature of the job was more inclined to be routine and lacked the variety and excitement that they craved and therefore use absence as a type of 'withdrawal behaviour' (Allebeck & Mastekaasa, 2004) to mitigate the effect of work. Or, could it be that extroverts, as a result of their assertive and impulsive nature, tend to act upon their frustration in contrast to conscientious individuals who, owing to their dutifulness and rule-orientated nature, are less likely to withdraw when dissatisfied? This observation concurs with past research which indicates that conscientiousness is also negatively related to withdrawal behaviours, such as turnover (Barrick, Mount, & Strauss, 1994). If neuroticism refers generally to a lack of positive psychological adjustment and emotional stability, then it seems likely that such

tendencies may make employees who are high on neuroticism more likely to engage in withdrawal behaviours such as absence from work. The results of Judge et al. (1997) are therefore somewhat surprising and no clear explanation is provided. One reason posited by Judge et al. (1997) is because of tendencies to worry about negative outcomes neurotic individuals may be more attuned to the potentially negative consequences of absence and remain at work. Finally, a longitudinal study using a mixed methodology found that in a population of hospital employees, high self-efficacy and personal attitudes were strongly influenced by parental behaviour – e.g. parents who were self-employed or worked in farming, and rarely had days off work because of illness – was a significant factor for zero absence (Schreuder et al., 2013). This paper calls for less research on risk factors associated with increasing sickness absence, and more investigation into how positive psychology can be used to reduce sickness absence, and perhaps demonstrates the determinates of a life course approach which forms early attitudes and sickness behaviours before the age of work.

In Study 2 and 3, CSE did not explain additional variance in the dependent variable of sickness absence, this is in contrast to the other four variables examined, particularly psychological distress where 8% additional variance was added above and beyond the 24% of work ability. An explanation for this could be because of the absence of extroversion and conscientiousness traits in the CSE construct which, as previously discussed, have been found to be associated with absence and indeed the conscientiousness trait was found to significantly contribute to the longitudinal regression model (Table 4.8) although the model change between work ability and the Big Five traits was not significant. Measurement of neuroticism is within the CSE construct, but it could be that the results of Study 2 and 3 reflect that of Judge et al. (1997) as a concern about the consequences of absence. Other factors to be considered was that the study populations were relatively low

paid workers without generous occupational sickness payment schemes and the study was conducted in an economic recession.

6.6 Validity and reliability of the work ability index, the core self-evaluation tool, and the Big Five inventory

Validity and reliability are two fundamental elements in the evaluation of a measurement instrument; an instrument cannot be valid unless it is reliable while the reliability of an instrument does not depend on its validity. Validity is concerned with the extent to which an instrument measures what it is intended to measure. Reliability is concerned with the ability of an instrument to measure consistently (Tavakol & Dennick, 2011) and in this thesis Cronbach's alpha has been used to measure reliability.

Evidence for internal validity, predictive validity, and reliability has been documented for the WAI (Martinez et al., 2009; Tuomi et al., 1997). Moreover, a study to assess the test-retest reliability of the WAI questionnaire gave additional support for the applicability of the questionnaire in occupational health research and daily practice of occupational health care (de Zwart et al., 2002). With regard to cross-national stability, a study by Radkiewicz and Widerszal-Bazyl (2005) found a high level, and thus concluded that the WAI instrument is universal and culture free. The WAI is now used in numerous countries (Alavinia et al., 2007; Bethge & Radoschewski, 2010; Bridger & Bennett, 2011; El Fassi et al., 2013; Gamperiene, Nygard, Sandanger, Lau, & Bruusgaard, 2008; Hasselhorn et al., 2005; Schouteten, 2017).

Core self-evaluation research conducted in the work and organisational context over the past decade demonstrates the importance and robustness of the construct. The CSE construct was originally developed in the US (Judge et al., 2003) but the use of CSE has been increasingly used internationally (Abikoye, 2007; Abikoye & Sholarin, 2012; Asgari, 2013; Brunborg, 2008; Dodd & Snelgar, 2011; Galvin & Smith, 2015; Greaves et al., 2017; Hilbert et al., 2014; Iqbal, 2012; Lian et al., 2014; Liu et al., 2015; Sheykhshabani, 2011; Stumpp et

al., 2010; Tsaousis et al., 2007; Yaakub et al., 2013; Zenger et al., 2015) with validations of the measure demonstrated in different languages (Brunborg, 2008; Hilbert et al., 2014; Holt, 2003; Stumpp et al., 2010; Zenger et al., 2015). However, as an emerging construct there is a continued need to verify the validity and utility of the CSE construct (Chen, 2011; Johnson et al., 2008; Schmitt, 2004) beyond the conceptual and empirical evidence related to leadership, job and life satisfaction, job performance, motivation, stress, and economic success, including income (Judge et al., 2005; Judge & Hurst, 2007). CSE research has therefore extended to the generalisability in other cultures and settings. A study by Rode, Judge, and Sun (2012) demonstrate incremental predictive validity for all tested criterion variables in samples of both US and Chinese workers which is supported by very similar results among Iranian, Japanese, and Korean workers (Holt & Jung, 2008; Piccolo et al., 2005; Sheykhshabani, 2011). While there is acknowledgement that more research is necessary to demonstrate the applicability of CSE as an international measure, and its generalisability in different populations (Sheykhshabani, 2011), results so far indicate that it is a robust predictor of a wide range of attitudinal and individual behaviours across a wide range of settings and environmental circumstances (Rode et al., 2012).

There is no single five factor model (Matthews et al., 2009, p. 41) and as previously discussed, a review of studies using the Big Five traits identified varied use in length, format, and theoretical origin (Zillig et al., 2002). It is argued that the taxonomy used makes a difference to the outcome of analysis and the conclusions about the usefulness and nature of the personality-performance relationship (Furnham, 2008, p. 123). Discussion of comparative validity and reliability of Big Five instruments is therefore difficult in the context of the use of different measures, although it is acknowledged that, despite this limitation, there is evidence that there is similarity in what is measured (Doyle, 2003, p. 294). In general, the NEO questionnaires represent the best-validated Big Five measures in the questionnaire

tradition (John & Srivastava, 1999). The scales have shown substantial internal consistency, temporal stability, and convergent and discriminant validity against spouse and peer ratings (McCrae & Costa, 1987; McCrae & John, 1992). However, the length of the NEO inventories have been criticised for practical use in most research studies, for example the 240 item NEO Inventory (Costa & McCrae, 1992) takes on average more than half an hour to complete, and is also more applicable for clinical assessment than for use in surveys (Denissen, Geenen, van Aken, Gosling, & Potter, 2008; Rammstedt & Beierlein, 2014). This limitation led to the development of the 44 item BFI to be used in research settings where subject time is at a premium and its short-phrase item format provides accessible vocabulary (John & Srivastava, 1999). Satisfactory reliability and validity data for the 44 item BFI has been demonstrated in various studies (Denissen et al., 2008; Fossati, Borroni, Marcgione, & Maffei, 2011). The Big Five instrument used in Study 2 and 3 is a short 10 item version of the Big Five Inventory (BFI) (Rammstedt & Beierlein, 2014) an abbreviation of the 44 item of the BFI. On average the BFI-10 scales have indicated sufficient psychometric properties (Rammstedt & John, 2007) and subsequent findings have corroborated the construct and criterion validity of the instrument (Rammstedt, Goldberg, & Borg, 2010; Rammstedt, Kemper, Klein, Beierlein, & Kovaleva, 2013). However, psychometric losses were noticeable and substantial for the BFI-10 Agreeableness scale and, for this reason, the addition of a third Agreeableness item was recommended by Rammstedt and John (2007) and adopted in this present investigation. The BFI-10 was originally developed in English and German, but an Italian version has verified the internal consistency of the 10 item scale, as well as its convergent and concurrent validity (Guido, Peluso, Capestro, & Miglietta, 2015).

6.7 Summary of results from study 4.

Aims of the study.

To prospectively compare the single item work ability score (WAS) and the short 14-disease item multi-item work ability index (WAI) in terms of the prediction of individual health (job satisfaction, psychological distress, job stress) and organisational effectiveness (sickness absence, work engagement).

There are three versions of the WAI: Long, short, and single item. The long version has 51 disease list items, the short version has 14 disease list items, and the single item version has 1 question concerning current work ability in relation to lifetime best. The single item has increasingly been used by researchers and practitioners to assess work ability (Ahlstrom et al., 2010; Carlsen et al., 2013; El Fassi et al., 2013; Harju et al., 2014; Hakanen, & Schaufeli, 2014; Jääskeläinen et al., 2016; Kuijer et al., 2012; Lundin et al., 2017; Lundmark et al., 2017; Neupane et al., 2011; Plat et al., 2012; Spanier et al., 2014; Vuokko et al., 2015).

The benefits in terms of simplicity, cost, and ease of administration and interpretation is said to be a major factor in its use (Bowling, 2005; El Fassi et al., 2013). In Study 1, one of the questions asked to UK and Finnish practitioners was ‘Which version of the WAI did you use?’ There was a limited response rate from the UK respondents, but among the Finnish sample (n = 83) 63% used the long version, 46% used the short version, and 15% used the single item question. These results are therefore in contrast to the research literature where the single item is increasingly being used.

The findings of Study 4 indicated that the WAI was a better predictor than the WAS for each of the dependent variables; psychological distress, job stress, job satisfaction, work engagement, and sickness absence.

6.8 Discussion of results from Study 4

There is generally a lack of research on the comparative use of WAI and WAS. The five comparative studies that have been conducted used different methodology and work populations. For example, El Fassi et al. (2013) used an occupational health database to analyse the work ability levels of employees who attended an occupational health service over a four year period. Their findings demonstrated a satisfactory level of convergent validity between WAS and WAI. Similarly, Schouten et al. (2015) investigated the predictive ability of the WAI with and without the list of diseases and the WAS in a cohort of workers who attended for occupational health checks over a two year period. Their findings showed no significance in the predictability of LTSA in the version of WAI with or without the list of diseases, but poor discrimination in the WAS. This finding is comparable to a prospective cohort study among construction workers using the WAI and WAS to measure disability. Risk predictions found that the ability of WAS to identify construction workers at increased risk of disability was poor (Roelen et al., 2014). The use of WAI to predict disability pension was also better than WAS in Finnish municipal employees using national data (Jääskeläinen et al., 2016) and Lundin et al. (2017) found the WAI had superior predictive validity to individual WAI items for LTSA. The WAS findings in Study 4 closely mirror those of Roelen et al. (2014), Schouten et al. (2015), Jääskeläinen et al. (2016), and Lundin et al. (2017) in demonstrating that the WAI was a far better predictor than the WAS of the dependent variables assessed.

Despite the lack of empirical evidence, WAS is gaining popularity as a measure in work ability research, with one paper – Ahlstrom et al. (2010) – being referenced in six other papers (Carlsen et al., 2013; Harju et al., 2014; Kuijjer et al., 2012; Lundmark et al., 2017; Neupane et al., 2011, Plat et al., 2012) as the justification for using the WAS. Single item measures have been discussed previously (see Chapter 5) because of the benefits of

simplicity, cost, and ease of administration (Bowling, 2005; El Fassi et al., 2013). Chapter 5 also discussed the differences of how and when the WAI and WAS should be used in practice. It was concluded that there is scope to consider WAS as a primary screening tool instrument and then as a secondary step administer the WAI to those identified with a low WAS score (Rolelen et al., 2014). Using the WAS as a baseline for new employees would be another practical option as part of a wider life course occupational health programme to measure progress and prevent a decline in work ability (Spector & Pindek, 2015). El Fassi et al. (2013) suggests the combination of the WAS and disease-based screening for improvement in occupational health care and Schouten et al. (2015) proposes the use of a modified WAI, without the list of diseases, as a screening tool to identify workers at risk of LTSA and in general public health surveys (Lundin et al., 2017). However, as already discussed in Chapter 5, the validity of any instrument does need to be established, and in Study 4 the predictive validity of the single item needs to forecast whether work ability is affected by the variables studied, not only because of its status as a sound experimental method, but also because of the very real human consequences which potentially arise when claims of causality arise from an invalid dependent measure.

6.9 Limitations of the current investigation

The aim of the following section is to discuss the limitations of Study 2 and Study 3 and, where applicable, suggest means for addressing these limitations in future studies. The limitations for Study 1 and Study 4 were summarised in the individual chapters. Overall, the main weaknesses of the studies were the number of participants, response rate, reliance on self-report data, macro-economic environment, and the restriction of the study population to the manufacturing sector.

6.9.1 Self-report measures

The use of self-report questionnaire, while possibly the most common and perhaps most necessary approach to collect behavioural data (Gupta & Beehr, 1982; Razavi, 2001), may lead to common method variance (CMV) which refers to variance that is attributable to the measurement method, rather than to the constructs the measures represent (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). It can therefore represent a systematic measurement error that either inflate or deflate the observed relationships between constructs. As previously discussed, in Chapter 4, while it is acknowledged it can occur, Spector (2006) argues that ‘the popular position suggesting that common method variance automatically affects variables measured with the same method is a distortion and oversimplification of the true state of affairs’ (p. 221). In particular, it may not be a critical problem when correlations found are modest in size (Podsakoff et al., 2003).

Study 2 and Study 3 took some necessary measures to minimise the potential problems of CMV. This included a longitudinal research design, which enabled temporal separation between collecting the data for the independent and dependent variables, the presentation of items in paper and electronic form, which was akin to the familiarity of the employees’ experience, different response formats for the items, and the emphasis of respondent anonymity (Podsakoff et al., 2003). Based on these considerations, and good to excellent internal consistency on four of the items (work ability, CSE, psychological distress, work engagement), it is proposed that CMV did not significantly bias the results of Study 2 and 3. Nevertheless, future research may benefit from including more objective measures, particularly on sickness absence which may be readily available from the Human Resources Department. More recent research on the prediction of sickness absenteeism, using both self-report and objective data sources, has demonstrated the validity of this approach (Schouteten, 2017).

6.9.2 Response rate and sample size

The response rate in the cross-sectional study (Study 2) was 21% ($n = 333$). This response rate was not high, but may be considered satisfactory based on prior research that suggests that response rates of organisational studies usually range between 16.9% and 54.5% (Baruch & Holtom, 2008). Moreover, the 333 participant responses exceeded the minimum sample size of 114 cases needed for linear multiple regression analyses, as calculated using G*Power (Faul et al., 2009).

In regard to the number of matched and valid responses in the longitudinal data 19-months later (Study 3), the final dataset was small ($n = 74$) and consequently is at risk of having insufficient statistical power to detect cause and effect (Maxwell, 2004). This was tested using a sample size calculation (Faul et al., 2009) which indicated that 118 cases were required for linear multiple regression analyses, and therefore confirmed that the study had insufficient statistical power to detect cause and effect (Maxwell, 2004). The results therefore need to be interpreted with caution, and ideally need to be replicated in further research within different industry sectors.

Macro factors such as the negative economic climate in the UK could have affected the response rate in both studies, as there was still concern about the sustainability of manufacturing productivity (Rhodes, 2014) in 2012 and 2014. Indeed, this was unavoidably demonstrated in Study 3 when one of the larger organisations withdrew from the study because of an organisational restructure and loss of jobs. This had the effect of reducing the total sample size by 148. The sample of employees were taken predominately from production areas where lower wages were paid, and so the threat of job insecurity could have produced a possible healthy worker effect, i.e. the possibility that non-respondents were more likely to be 'unhealthy'. However, as presented in 4.5.2, potential non-response bias between responders and non-responders demonstrated that, apart from age, there was no significant

difference between responders at T2 and non-responders in Study 3. This finding leads to the conclusion that data collection procedures could have been enhanced with further reminders and pre-survey explanations to maximise the response rate of the employees involved in the study. In retrospect, a further consideration would also have been to increase the sample size by the recruitment of more organisations at T1 to mitigate the risk of unacceptable statistical power because of a small sample.

6.9.3 Generalisability

In quantitative research, replication of participants, in the form of adding to the sample size, can enhance not only statistical power, but also generalisation of the findings to settings and people outside the context studied (Polit & Beck, 2010). As previously discussed in 3.5.5 there is a limitation in generalising the results of Studies 2 and 3 to the wider manufacturing industry because of the lack of demographic manufacturing data. The failure to be able to generalise the findings is therefore a significant limitation and while the intention was to contribute to the dearth of empirical work ability research in blue collar workers, in retrospect the ability to generalise the finding could have been more thoroughly considered in the conceptual phase of the research design.

6.9.4 The study design

Study 3 endeavoured to build on and extend the cross-sectional design that offered limited opportunities for establishing the stability of results over time and for making causal inferences. As previously discussed, in Chapter 4, there is varying opinion on the optimal time lag in psychology research, and little discussion about the appropriate time intervals between measures (Ford et al., 2014; Zapf et al., 1996). Therefore, a two wave longitudinal panel research design to collect data over a period of 19 months was used partly because of the risk of losing more participants if the time lag was longer. However, there are limitations in regard to the longitudinal investigation that need to be recognised. The assumptions and

conclusions of the study are limited to two waves at a single time period of 19 months and the extent to which these influences continue is unknown. It could be that while the portion of variance left to be explained was small, further multiple time points would add more knowledge. Replication of this study using a larger sample and multiple time points is therefore recommended in different industry sectors.

As more comprehensively explained in Chapter 1, the inclusion of personality measures in relation to work ability was to build on the evidence influencing values, attitudes, and motivation to work, the so-called third floor of the work ability house (Figure 1.1). The well-known Big Five construct, and the lesser known but emerging measure of Core Self Evaluation, was chosen to compare and potentially discover new knowledge in the context of the variables studied. The findings indicate that of all the four studies, the longitudinal relationship (Study 3) between T1 predictors and T2 outcomes in comparison with the cross-sectional analysis was weak. The limitations in respect of methodology has been acknowledged, and therefore it could be said that the failure to demonstrate cause and effect has a wider implication on the successful practical utility of the WAI, the Big Five, and CSE. The findings of Study 3 can therefore be described as useful as an inductive/exploratory approach in the attempt to discover new knowledge and patterns of data in which to base further confirmatory studies (Spector, 2017).

6.10 Practical and theoretical implications

Personal and health information about employees provides rich data to organisations who want to optimise their ‘human capital’ and, practically, it is possible to incorporate all the suggested ways of using the work ability index into screening and health-based programmes. As evident by the research that underpins personality, identifying employees with a high or low score would also provide valuable information on the personality of employees and the effect this can have on their motivation to work, consequent behaviours,

and selection into occupations. This data is complex and needs to be interpreted carefully and therefore factors related to validity, morality, and the ethical use of such data does need to be explored. At the same time, the theoretical and practical use to occupational health within the UK has to be considered in the context of the wider approach to public health, demographics, and changes in work motivational theory. The next section of this chapter will focus on these factors.

6.11 Ethics and legal considerations

Ethics is a term used to describe ways of examining and understanding moral life, how we decide what is right and wrong, and why we come to these conclusions (Faculty of Occupational Medicine, 2012). It is outside the scope of this thesis to examine the many ethical theories, but to provide context in the practical application of occupational health research, a brief discussion is necessary. This is because in health and psychology personal information is increasingly seen as a resource with value to multiple parties in work and health. The complexity of this relationship and the drive to reduce sickness absence and improve productivity among employees can present challenges with regard to the legal and ethical disclosure of information from those that hold the data. This is particularly pertinent when employers and employees may not be aware of the ethical constraints under which health care professionals operate, and therefore present a conflict when requested to implement research into practice. In this thesis, the ethical considerations in relation to the research conducted have been explained in Chapters 2, 3, and 4. There are clear guidelines from The British Psychological Society (BPS) and the BPS document 'Code of Ethics and Conduct' (BPS, 2009) provides guidance for the researcher. In addition, as the research was conducted from a university base, the ethical procedures of the university were also considered. This involved obtaining ethical approval from the research ethics committee of the Institute of Work, Health and Organisations at the University of Nottingham.

In practice, there is a close relationship between ethics and the law which provides a framework for the guiding principles of what is and what is not acceptable behaviour within the practice of professional healthcare. The different professional bodies within occupational health practice will have their own ethical guidance for which members are accountable if it is deemed unacceptable by others. For example the Nursing and Midwifery Council (NMC) Code of Conduct (2015) clearly states that all nurses pay special attention to promoting wellbeing, preventing ill health, and meeting the changing health and care needs of people during all life stages; a duty of confidentiality and working within limits of competency to all those receiving care is, among other guidance, paramount. The Faculty of Occupational Medicine (2012) has published guidance on ethics which includes principles that underpin the duty of care to include; fostering autonomy for individuals; enabling them to make informed choices; acting fairly and without prejudice; protecting life and health at all times; maintaining confidentiality, and justifying trust. The BPS document 'Code of Ethics and Conduct' (BPS, 2009) is based on four ethical principles, which constitute the main domains of responsibility within which ethical issues are considered. These are respect, competence, responsibility, and integrity. It can therefore be concluded that there is a good concordance between the various ethical guidance of different professional bodies with the common denominators being the duty to maintain confidentiality, working within the scope of competency, and to do good, not harm.

Legally, all healthcare professionals are required to comply with the law in the country in which they practice, and to also consider national laws in the age of globalisation. In the UK, legislation regarding the Human Rights Act 1998, Data Protection Act 1998, and the Equality Act 2010 (Disability) interface with the ethical considerations that need to be considered in practice. Of particular interest is the data protection requirement of information considered to be sensitive data. The collection, processing, and use of any health information

(mental or physical) has to be justified for the use in employment purposes, interpreted by those qualified to do so, and processed under informed consent from the employee. Equally it could be considered unlawful to discriminate under the grounds of disability if, for example, an individual was excluded from their job because of disclosure of a physical or mental health condition.

The Finnish Institute of Occupational Health (Taskinen, 2004) states that ‘in order for the promotion of work ability to be successful, the procedures must be ethical, respecting human dignity and there must be an atmosphere of openness and trust in the maintenance of workers’ work ability’ (p. 117). The practical use of the WAI is confined to use by occupational health services in Finland who are bound by very similar ethical principles on confidentiality and data protection as occupational health professionals in the UK (Taskinen, 2004). The key difference to use of the WAI in Finland is the legal requirement to collect data to target health promotion and other activities to maintain work ability. However, as Hasselhorn (2008) acknowledges, individual results need to be treated in strict confidence, feedback of group results must follow rules that prevent identification of individuals, data protection always needs to be assured, and confidentiality is the precondition for allowing the WAI to unfold its full value. In the UK, work ability scores could be used in advising the employability of workers, but arguably this would be a misinterpretation of the WAI because the WAI scores reflect the degree and quality of the interaction between work and the worker and are not necessarily a score about health. Thus to use it for the purposes of whether a worker should be employed or not could be deemed unethical and discriminatory if there is a health condition which meets the definition of the Equality Act 2010. Indeed, Schouten et al. (2015) cite moral reasons for not identifying high risk workers in times of organisational downsizing or when employing new personnel.

In Study 1 (Chapter 2), the question of who should use the WAI was asked and both Finnish and UK respondents identified OH nurses and physicians as the two main groups that ought to use the instrument. Finnish respondents identified researchers as the third eligible group; presumably because of the influence WA research has had on Finnish legislation and policy, while for UK respondents it was primary care practitioners such as GPs. The evidence for whether the scores are different, depending on who conducts either work ability interviews or administers questionnaires, is scant. Geissler, Tempel, and Geissler-Gruber, (2005) addressed this question by using a non-medical professional and an occupational physician in a small study. The results identified significantly higher WAI scores when the non-medical professional interviewed participants, in contrast to occupational health physicians. The researchers could not explain why there was a difference, other than the possibility that the interviewees had simply forgotten their diseases and were reminded of them by the occupational physician who was familiar with medical language. An explanation not considered was the element of implied confidentiality and, consequently the disclosure of further health information because of the knowledge that they were speaking to a doctor.

Using personality scores raises similar dilemmas and ethical questions as WAI scores. In many organisations, there is an ongoing question of whether to try to select people with the ‘right stuff’, or to try to use developmental experiences like training, coaching, or challenging assignments to try to help employees develop the required attitudes and abilities (Judge & Kammeyer-Mueller, 2011). Lyons (2015) advocated the use of the CSE measure by HR specialists in employee recruitment and selection activities as Judge and Kammeyer-Mueller (2011) argue that individuals who have higher levels of CSE are more likely to be suited to jobs and occupations that require a great deal of personal initiative. Conversely, Hiller and Hambrick (2005) are cautious of using a CSE approach for selection as they argue that high levels of CSE may cause individuals to ignore negative information, take unwarranted risks,

and overestimate their abilities. The other consideration is the question of inequality and possible social discrimination if there is exclusion of those with a low CSE from pools of candidates. This is based on the evidence that CSE is significantly correlated with various childhood indicators of socioeconomic status; parents' education level, years of education, and freedom from poverty (Judge & Hurst, 2007). Finally, the approach/avoidance framework (Ferris et al., 2011) predicted that high-CSE employees are likely to adopt problem-focused coping whereas low-CSE employees tend to use emotional-focused coping. In a cultural context this is important as cross-cultural research has shown that in western countries, such as the US, problem-focused coping is highly valued and emotion focused coping is distrusted. Conversely, in China, it is reported that emotion-focused coping is usually more effective because of the emphasis on group harmony, interdependence, and concern for others (Liu et al., 2015).

The use of the Big Five traits in occupational selection has been debated over the years, but Barrick and Mount (1991) illustrated the benefits of using the Big Five for selection, training, and development which escalated its use in recruitment selection throughout the 1990s (Hurtz & Donovan, 2000). However, researchers have criticised the unthinking and misguided way in which they have been used since the Barrick and Mount review (Schmitt, 2004). One of the largest concerns relates to the predictive validities of the Big Five, including conscientiousness, tending to be low to moderate in magnitude (Hurtz & Donovan, 2000; Schmitt, 2004). This has led researchers to question the predominance of self-report personality tests in selection testing (Doyle, 2003, p. 295; Morgeson et al., 2007). The employment of people with mixed age, ability, and ethnicity has inevitably led to different skills and work attitudes which need different attributes to previous generations and therefore continually change the factors crucial to selection (Furham, 2008, p. 358).

The second concern is that of social desirability, or impression management, defined by Matthews et al. (2009) as ‘deliberate attempts to present oneself as possessing, or not possessing, particular qualities either by outright lying (faking) or by a more benign massaging of the truth’ (p. 397). The social desirability debate about faking is rather more complex than the obvious conclusion that when people apply for a job they unusually want to create a good impression as in some roles, such as entertainment and customer service, ‘faking’ is part of effective job performance (Morgeson et al., 2007). The ‘dark side’ of behaviour at work, namely sabotage, theft, vandalism, and whistle blowing, is now of considerable interest to organisations and consequently has led to an interest in recruiting and selecting against ethics, honesty, and morality (Furnham, 2008, p. 317). Indeed, Sudha and Khan (2013) recommend careful examination of personality profiling in recruitment based on their use of the Big Five in the identification of potential deviant employees and the findings that high neuroticism relates positively to organisational deviance. However, the use of integrity tests as a selection technique not only raises validity and faking issues, but also fairness and privacy concerns around life experiences, cultural, social, and political values (Karren & Zacharias, 2007). Physiological indicators of personality – e.g. heart rate – have been suggested as useful additions to conventional tests for the purpose of selection of personnel who work under stressful conditions (Brouwer et al., 2015) and it could be reasoned that, as a sensible measure, and a risk assessment approach, occupations considered particularly pressurised may benefit from a selection process that measures traits that help moderate the effects of a stressful, pressurised job. In the UK this could be justified, but as specified by the Data Protection Act 1998, an impact assessment would need to be carried out first to explain why and how it could contribute to an employment decision without discrimination.

In conclusion, researchers are well versed in following ethical guidelines in relation to conducting research. However, once the results are published and/or practitioner organisational data is collected, there are also ethical, discrimination, and moral issues to consider when the use of data determining an individual's work ability and personality is used to inform employment decisions regarding potential and existing employees.

6.12 Workplace interventions

6.12.1 Public health approach

Early public health work in the first half of the century concentrated on environmental reforms such as improved sanitation, clean air and slum clearance. In the 1950s and 60s, the focus changed towards the need for a lifestyle approach which led to health education programmes addressing smoking, exercise, and alcohol consumption and a 'professionalism' of health which told individuals what to do. Illich (1976) stated

a world of optimal and widespread health is obviously a world of minimal and only occasional medical intervention. Healthy people are those who live in healthy homes on a healthy diet in an environment equally fit for birth, growth, work, healing, and dying; they are sustained by a culture that enhances the conscious acceptance of limits to population, of aging, of incomplete recovery and ever imminent death. Healthy people need minimal bureaucratic interference to mate, give birth, share the human condition, and die (p.106).

A few decades later, those favouring a holistic approach largely agreed with Illich's (1976) philosophical approach to health, arguing that a modern health care system took away control over health and illness and created a dependency on a biomedical model of health which medicalised aspects of life such as pregnancy, bereavement, ageing, and adolescence and an expectation that medicine could also cure lifestyle diseases (Ewles & Simnett, 1992).

More recently, a modern approach to public health favours a more up-to-date definition of a life course approach, which uses the framework of intervention at a primary (population), secondary (group/individual), and tertiary (therapeutic and curative) level (Public Health England, 2013). Preventative health is now the new wellness of the future, but there are challenges to practising this in the workplace because of the widening demographic of four generations of workers co-existing in the workplace with different needs and expectations of employment. The next section will review work ability in the context of an ageing workforce.

6.12.2 The ageing workforce and work ability

The older worker has received much attention in work ability research (Ilmarinen, 2001; Plat et al., 2012; van den Berg et al., 2008) which is perhaps not surprising as it was concern about the ageing workforce from pension institutions that developed the WAI in the first place. This is discussed further in Chapter 1. In the UK, the ageing workforce is an area of interest by politicians and workplaces because of the increase in the number and proportion of older people in the population. In mid-2014, the median age of the UK population (the age at which half the population is younger and half the population is older) was 40 years, which is the highest ever estimated (Office for National Statistics, 2014). Factors such as the removal of the default employment retirement age and the raising of the State Pension Age will require people to need and want to continue working. Existing UK state pension ages of 65 for men and 63 for woman are due to equalise to 65 for both genders by 2018, 66 by 2020 and 67 years by 2028 (Department for Work and Pensions [DWP], 2014). Longer trends of withdrawal from the labour market for men and women has identified an increasing trend in age; in 2012 it was 64.8 years for men and 62.6 years for women, but it is predicted that this will rise as the changes in state pension withdrawal take effect (Office for National Statistics, 2013). In manufacturing it is estimated that there are

more than one million workers aged over 50 years which equates to 33.8% of the manufacturing workforce (CIPD, 2015c). Employment which matches the needs of older workers has therefore led to guidance and advice from a variety of organisations and agencies interested in the sustainability of the older worker (CIPD, 2015b; Flynn & Houston, 2015; Taskila, Shreeve, Laghini, & Bevan, 2015), and the promotion of work ability as an early intervention (Faculty of Occupational Medicine, 2014; Flynn & McNair, 2007; Harrison, 2016). A common finding in the relationship of work ability and age is that work ability tends to decrease with age (Costa & Sartori, 2007; Ilmarinen et al., 1997; Nachiappan & Harrison, 2005) It is suggested that this is not surprising, as the status of health is age-related, and as the WAI contains several health items, a decline in health is highly likely to be reflected in a lower WAI score (Ilmarinen, 2009). This is demonstrated by a Finnish 11-year-old follow up study (Seitsamo & Klockars, 1997) which found that a risk of decline in perceived health was ten times higher in people having three diseases as compared to those with no disease.

Evidence on the relationship of WA and ageing has led to a number of conclusions;

- 1) Age may have a greater effect on the work ability of manual rather than non-manual workers because of a declining functional capacity and physical job demands which do not follow the natural biological changes of ageing (Costa & Sartori, 2007; Ilmarinen, 2001; Lin, Wang, & Wang, 2006; Tuomi et al., 1997; von Bonsdorff et al., 2011).
- 2) Ageing was accompanied by an increase of chronic health problems which was associated with a decrease in WA (Freude et al., 2005; Leijten et al., 2014; Pohjonen, 2001).
- 3) The WAI has a high predictive value: of those having a poor WAI at the age of 44-58 years, 62% had retired on a disability pension 11 years later (Tuomi., 1997) and a sharp decline in WA after 50 years of age was highly predictive of a disability pension five years later (Liira., 2000).

- 4) Ageing workers with a high body mass index report a lower WA (Bridger & Bennett, 2011).
- 5) Regular physical exercise can mitigate the declining effect of work ability between the ages of 45-65 years (Ilmarinen, 2001).
- 6) The process of ageing can contribute to better coping strategies as human resources grow in the areas of strategic ability, wisdom, and experience (Costa & Sartori, 2007) which in turn can mitigate the effect of a health problem on work ability by the process of coping and adaptation (Leijten et al., 2014).
- 7) Menopausal symptoms are negatively associated with work ability and may increase the risk of sickness absence (Geukes, van Aalst, Marielle, Nauta, & Oosterhof, 2012).

Work ability is the balance between managing job demands in relation to health and mental resources (Coomer & Houdmont, 2013), which can change with age (Freude et al., 2005; Leijten et al., 2014; Pohjonen, 2001), but evidence of interventions to improve health in the older worker is narrow (Cloostermans et al., 2014; McDermott, Kazi, Munir, & Haslam, 2010). A review of the evidence on ageing workers and WA has led to recommendations for intervention in three main areas; workplace health promotion, health surveillance programmes, and rehabilitation programmes for sick leave employees.

Health promotion interventions with particular emphasis on increasing worksite physical activity and preventing obesity (Freude et al., 2005; van den berg et al., 2008) are considered beneficial and support the correlation found between high body mass index and lower WA (Bridger & Bennett, 2011), but the evidence remains mixed. One such study monitored the effects and constancy of a worksite physical exercise intervention in relation to the physical fitness, perceived health status, and work ability of female service workers during periods of one and five years (Pohjonen & Ranta, 2001). Consistent positive effects were observed with a decrease in body fat, an increase in dynamic muscle performance, and

maximal oxygen consumption in relation to body mass. The decline of WA was also three times faster in the control group than the intervention group. However, a similar study which introduced guided worksite exercise once a week among women engaged in physical laundry work, found only a slight improvement in perceived work ability (Nurminen et al., 2002). Nurminen et al. (2002) concluded that at baseline the study group had a mean WAI score of 'good' which may explain the results of little change. This finding also corresponds with an exercise intervention study of construction workers where no significant change in work ability, sick leave, productivity, or musculoskeletal pain was found (Gram et al., 2012). Gram et al. (2012) concluded that 'an important factor for achieving an improvement in work ability is the baseline level, as a low level has a higher potential for improvement whereas a high level may result in a ceiling effect'.

Costa et al. (2005) report the results of a periodical health surveillance programme using the WAI to plan preventative measures for healthcare workers. Specific illnesses, particularly skin and neuropsychic illnesses, were identified and a decrease in WA between shift and day workers was demonstrated. At a primary level, this evidence-based approach has the potential, for example, to influence policy on working hours and occupational health measures to investigate why healthcare workers are experiencing skin and neuropsychic illnesses and the measures necessary to prevent a decline in WA. A study to evaluate a multidiscipline rehabilitation programme for employees on long term sick leave included group activities (outdoor activities, water training, horse riding, spinning, gym, and stretching) as well as body awareness and relaxation training, confidence, coping, and learning skills (Braathen, Veiersted, & Heggnes, 2007). The authors report improved work ability after four months when compared to the control group, but return to work was, to a considerable extent, predicted by addressing adverse psychosocial aspects such as improvements in work ability, change in work motivation, and rumours of change in the

workplace (Braathen, et al., 2007). However, for employees with no major health problems, a vocationally-oriented multidisciplinary rehabilitation programme which is directed to improving physical and mental health has been demonstrated to be ineffective in relation to improving perceived work ability (Saltychev et al., 2012). The predictive factors of participation suggest that the selection of participants for rehabilitation is not based on the participants' risk profiles derived from evidence on risk factors for adverse outcomes, so instead employees who were healthier, had fewer behavioural health risks, and were exposed to lower levels of work-related risk factors progressed to rehabilitation (Saltychev et al., 2011). The evidence for targeted selection based on WAI scores is growing. More recently Ojala et al. (2017) demonstrated a significant improvement in WAI values following an outpatient cognitive behavioural early rehabilitation programme with a targeted approach of selection based on occupational health professionals' knowledge of current and previous diseases and work demands. A study by Taimela et al. (2008) selected employees at a high risk for sickness absence by a health survey and provided an occupational health care intervention to support the working ability of the individuals by the provision of advice and possible specialist referral. The intervention showed a clear advantage in sickness absence rates and lends support to a selection criteria of employees for such programmes. In the UK, the concept of adjustments to work practices is firmly established because of disability discrimination and is part of case law and therefore occupational health practice (Kloss, 2010, p. 308). Measures such as flexible shift patterns and reducing physical work for manual workers would adjust the balance of work to individual functional capacity by more strategically influencing policy development across the workforce if patterns are identified. This type of primary intervention has the potential to target all ages so, by definition, would benefit the ageing workforce.

Pohjonen and Ranta (2001) recommend that early prevention must start before the age-related deterioration of health and physical capacity which supports the view of other researchers who recommend that interventions should start in the younger workforce (Bridger & Bennett, 2011) rather than target an older workforce demographic. This is partly because of the prevention of chronic health problems before they occur and thus a lower WA, and is also a result of low labour participation and early retirement rate in age groups of 55 years and older (Nurminen et al., 2005). In the UK, age discrimination legislation has influenced an all-age approach with a consequent decline in specific 'age related' targeted health programmes because of the difficulty of objectively being able to justify such programmes (ACAS, 2014). For example, offering a workplace healthy initiative to those only over 50 years would potentially discriminate against those under 50 years old and vice versa.

An evidence based use of work ability in relation to workplace health promotion activities, health surveillance, and rehabilitation or adjustment activities, is therefore likely to help the ageing demographic by introducing workplace risk-based interventions to all generations. This is particularly pertinent, as currently there is a poor evidence base for the use of risk assessments over the age of 65, as typically the research has been conducted on people under the age of 50 (Crawford, 2016). This approach is more likely to be successful in the UK if it is part of an all-age approach which starts at the point a younger worker enters the workforce; this would avoid the risk of age discrimination as previously discussed and identify priorities at different stages of life in line with the work ability model (see Fig 1.1) and psychosocial factors commonly found to affect WA and early retirement (Uronen et al., 2017). Support for an all-age approach rather than specific targeted age groups has also increased among public health bodies (Public Health England, 2014) and researchers (Illmarinen, 2011; McDermott et al., 2010; Viotti et al., 2017) as empirical evidence has

widened to include the relationship between work ability and younger workers (Palermo, Webber, Smith, & Khor, 2012).

With a focus on an all-age approach, the younger worker is now beginning to be researched. Physically strenuous work was found not to reduce younger workers' work ability (Bostrom, Sluiter, & Hagberg, 2012; Winding, Labriola, Nohr, & Andersen, 2015) which is in contrast to the older worker (Ilmarinen, 2001; Koolhaas, van der Klink, Groothoff, & Brouwer, 2011; Platt et al., 2012). Decreased job control and increased negative influence of job demands on private life over time seemed to be the most important work factors associated with reduced work ability among young workers (Bostrom et al., 2012). Winding et al. (2015) found that the importance of vulnerability, especially self-esteem in late childhood, was an important risk factor because of the influence of negative affectivity. These two papers perhaps demonstrate the view that work ability, as experienced and observed in the workplace, is influenced by two forces; 1) What employees bring with them to the workplace in terms of personal resources, health practices, beliefs, attitudes, values, and hereditary endowment. 2) What the workplace does to the employees once they are there in terms of organisation of work in both the physical and psychosocial sense (Shain & Kramer, 2004). In practice, these forces interact to affect health in a positive or negative way and influence the ability of individuals to care for their own wellbeing and maintain work ability.

As indicated in this present chapter, there has been a plethora of research on the determinants of work ability and personality which could be considered important to tailor interventions to increase work ability and understand its decline. However, the evidence related to workplace interventions is poor and the papers that have been published have failed to convincingly demonstrate significant improvements in WAI (van den Berg et al., 2008) or long term work disability (Saltychev et al., 2012). Nurminen et al. (2002) called for a multi –

professional approach to promote work ability when the results of an intervention encouraging physical activity once a week at worksites had little effect on work ability or sickness absence. However, this approach was not effective in such an interventional study and consequently it was acknowledged by Saltychev et al. (2012) that a multiprofessional team targeting improvement in a healthy lifestyle could have been more effective if there had been more precise criteria for participant selection and modifying the content of the programme towards a more individual and practical approach as demonstrated by Ojal et al. (2017) and Taimela et al. (2008). It is also possible that, if measured, other beneficial effects on the participant's individual characteristics, such as health risk behaviour, work satisfaction, anxiety levels, and self-rated health, could have been demonstrated. A review by Schröer, Haupt, & Pieper (2013) summarised the effectiveness of different workplace health interventions for promoting healthy lifestyle, preventing diseases, and reducing health care costs and found that most studies implemented short programmes of six months or less, ignoring possible weight regain and sustainability of changed activity and dietary behaviour. Thus, effects may have been overestimated. Furthermore, it was concluded that only long term changes of health behaviour will achieve an improvement in health status.

The lack of evidence related to interventional research is somewhat surprising given the emphasis on wellness in the workplace and the use of the WAI in many Finnish workplaces. Could it be that the approach of health education and promotion as advocated by a model of public health which focuses on education and a plan designed by health professionals fails to engage the motivation necessary to sustain the intervention? In addition, just as it is acknowledged that on a national population level attempts to change behaviour have not always led to universal improvements in the population's health because of the many different facets to consider, e.g. different group reactions to incentives and disincentives, or 'fear' messages, not a priority for the individuals being targeted and

motivated individuals requiring a different approach from those who are demotivated (Swann et al., 2010), perhaps blanket workplace health interventions, policies, and procedures are therefore questionable when one considers addressing different individual and demographic needs.

6.13 Further research

The psychosocial issues examined in this thesis included job satisfaction, work engagement, and sickness absence. Work ability is a multidimensional construct with an individual's health and functional capacity as the foundation. However, work ability is also a function of workers' competencies, their values and attitudes, their family life and close community, their external environment, and the influence of aspects of working conditions and work organisation (Ilmarinen et al., 2005). As previously discussed, the evidence presented in this thesis demonstrates that at baseline, work ability, and to a lesser extent personality, was associated with factors such as psychological distress, job stress, job satisfaction, work engagement, and to a lesser extent sickness absence. The longitudinal associations were likely to have been influenced by methodological limitations, namely an 'underpowered' sample size (Maxwell, 2004) and so cannot be demonstrated as a significant finding in relation to occupational health practice. Nevertheless, an overview of the literature and learning from this thesis has led to a number of conclusions and discussion points on potential future research which could benefit the UK workforce.

Life course approach. Research has demonstrated that as employees go through their life course, situational factors may influence relationships between age and work motivators which require different job features (Incoeoglu & Warr, 2011; Kanfer, Frese, & Johnson, 2017). A work ability approach could therefore provide a proactive method in which employee's issues are identified and appropriate adjustments and adaptations put into place over a life course. Ethical considerations as previously discussed in 6.11 would need to be

considered, but potentially systematic data collection on work ability in different industry sectors at all stages of work life could provide better understanding on the impact of extending working life in the UK.

Psychosocial aspects. The WAI has not traditionally assessed the psychosocial characteristics of an organisation, although emerging research has demonstrated a correlation between occupational health psychosocial factors and WAI scores (Uronen et al., 2017). While occupational medicine has a clear role in evaluating fitness for work, health surveillance and return to work expertise is also needed to identify the barriers to continuing to work (Crawford, 2016). Based on the Uronen et al. (2017) study and the thesis findings (Study 2) expanding the work ability approach to include psychosocial factors is therefore a promising area in which to develop further research in order to translate into practice.

Job crafting. Longitudinal studies using the WAI have identified that for most respondents with stable work ability there was either no or a minor (1 point) change over a decade (Tuomi et al., 1997; von Bonsdorff et al., 2011) which was a similar finding in Study 3 of this thesis. The possibility that a health problem, which initially causes a decrease in work ability when measured at baseline, is mitigated by the adaption of the worker to the health problem, or by adjustments in the workplace, has been observed by researchers (Leijten et al., 2014). The role of self-initiation to make changes to work has been found consistently to increase work engagement (Bakker et al., 2012; Tims et al., 2013) and act as a buffer in highly demanding work situations (Hakanen, Seppälä, & Peeters, 2017). The role of job crafting to meet resource needs and preferred styles and ways of working is a potentially interesting concept as people age or their health declines. Further research could thus lead to more understanding on the role of job design and barriers which prevent sustainable working. Similarly, the value of work adjustments recommended by professionals is also an area of

research to be explored particularly as this is a fundamental part of occupational health practice in the UK led by legislation such as the Equality Act (Disability) 2010.

Resource management. Personality may influence the effectiveness of coping strategies and resource management by facilitating or interfering with successful implementation of the strategy and even influence treatment options (Carver & Connor-Smith, 2010). For example, increased levels of conscientiousness have been associated with a higher likelihood of compliance in therapeutic treatment (Quilty et al., 2008). However, in resource management research there has been a move to understand individual change to an intervention, e.g. self-efficacy and optimism, which has led to other models than the Big Five being used (Carver & Connor-Smith, 2010; Kammeyer et al., 2009). One such study examined the effect of CSE and working mothers and found that higher CSEs were associated with improved mental health when mothers had high levels of control in their work environment which subsequently protected them against emotional exhaustion from work (Greaves, Parker, Zacher, & Jimmieson, 2017). This suggests that using a CSE approach to identify individuals with low scores and provide targeted interventions to help increase CSE, particularly self-efficacy, may help buffer and provide coping skills to those for whom psychological distress is a recurrent problem and for those for whom unhealthy behaviour is a way of coping.

Two approaches in particular, based on positive psychology literature, are of interest. The first is the broaden and build theory, which encompasses positive emotions to build psychological resilience and improved psychological and wellbeing (Fredrickson, 2004); the second is COR theory which is a resources-orientated model based on the supposition that people strive to retain, protect, and build resources and that what is threatening to them is the potential or actual loss of these valued resources (Hobfoll, 1989). As already discussed in this chapter (6.5.2), job stress is largely managed in the UK by a primary risk assessment

approach that empathises an estimation of risk to identify possible sources. Measuring individual stress, or taking into account personal resources, has not widely been considered to understand and improve individual mental health resources. There is therefore support in the idea that training people in self-efficacy, stress resiliency, and mindfulness can create additional resources (Greaves et al., 2017; Nielsen et al., 2017) and the use of the CSE construct to measure outcomes because of the likely malleability of the construct (Chang et al., 2012). Further research is therefore necessary to develop a more integrated individual and organisational approach to stress management in the workplace, so a balance of job characteristics, adequate job redesign, and mental health resources is considered. This approach has support from organisations such as the Chartered Institute of Personnel and Development [CIPD] which, in a recent policy report (Suff, 2016) on wellbeing, recommended a review of the HSE Management Standards (2007). The CIPD argued that they now need to reflect the change in society and the world of work in the last decade and also ensure that they fit with a holistic and all-embracing concept of wellbeing; this includes the understanding and management of mental wellbeing.

Health promotion. As previously discussed in 6.12.2, health promotion intervention with particular emphasis on increasing physical activity and the prevention of obesity has been found to be beneficial (Freude et al., 2005; van den berg et al., 2008;) but the evidence does remain mixed and appears to be related to the baseline measure of work ability (Gram et al., 2012). In contrast, emerging research using the CSE concept has found a relationship between low CSE and obese and overweight individuals, suggesting that low CSE could be utilised as a key in identifying individuals at higher risk of negative health consequences of internalised weight bias (Hilbert, Braehler, Haeuser, & Zenger, 2013). Some consistent correlates of physical activity are individual-level factors such as age, sex, health status, self-efficacy, and previous physical activity (Bauman et al., 2012). As CSE predicts better than

individual traits the investigation of self-efficacy, self-esteem, locus of control, and neuroticism (Emir & Judge, 2001) research could be designed using both work ability and CSE (which measures self-efficacy) as a measure to determine the effectiveness of workplace interventions and contribute to the emerging literature on this area of interest. Of particular interest is whether occupational health professionals move away from the ‘expert’ role and possibly use techniques such as motivational interviewing and coaching. This is to help individuals take control over their health and ill-health as opposed to ‘telling them what to do’. Using multidisciplinary practitioners skilled in these techniques is common practice on an individual level, but further exploration of wellbeing interventions and longitudinal research is necessary to provide an evidence base for this type of positive psychology approach on a larger scale within organisations.

Work productivity. Dame Carol Black’s review of the health of the working population (Black, 2008) recommended robust models for measuring and reporting on the benefits of employer investments in health and wellbeing (p. 11). In 2016, a report by the Council for Work and Health (Harrison, 2016) recommended the following:

Ensure that employers understand the return on investment in occupational health and have access to the right professionals to create healthy and productive work and workplaces and reduce the risk of harm from badly designed or managed work and workplaces’ (p. 10).

Additionally, it was clear in this thesis that economic productivity was of significant interest to the sector and cost effectiveness of workplace interventions as a whole an important factor in influencing interventions in the workplace (Burdorf, 2007; Harrison, 2016). However, the measurement of production loss is not easily measurable in terms of health (Mattke, Balakrishnan, Bergamo, & Newberry, 2007) but in terms of work ability there have been steps to address this with the focus on the use of work productivity scales.

For example, work ability has been strongly associated with health-related production loss, particularly sickness presenteeism (Karlsson et al., 2015; Vänni, Virtanen, Luukkaala, & Nygård, 2012). Further research using a combination of work ability and productivity scales is therefore likely to be of interest to both employers and occupational health professionals.

6.13.1 Future developments for occupational health

In 2013, on a visit to Finland, the author of this thesis was shown a new prototype work ability tool designed to holistically measure all five structures presented in the Work Ability House (see figure 1.1). A work ability tool is currently under development which aims to address the wider factors identified in the work ability model. The objective was to design a practical tool which identified the balance of personal resources and work demands throughout the life course of an employee. This was called the work ability – personal radar (WA-PR). The validity has since been tested on an initial sample consisting of 3,912 participants from 29 different companies. The results are encouraging and conclude that ‘attempts for work ability promotions should utilise the multidimensional approach to work ability by detecting and discriminating between different factors, and by locating areas, as well as groups, that are most in demand for actions’ (Ilmarinen et al., 2015, p. 13). Further research is being conducted to refine the tool, but the initial observations offer a more cost effective and versatile method to assessing work ability with scope to build on more specific areas of positive psychology (e.g. work engagement) and so could be of considerable interest in the UK.

In October 2016, *Improving Lives: The work, health and disability green paper* was published to consult on the relationship between health, work, and disability (Department for Work & Pensions [DWP], 2016). One of the key proposals for discussion is the introduction of a work coach to provide employment support to disabled people and people with health conditions. This new role is expected to help individuals with health conditions to identify

health and work goals, draw out their strengths, make realistic plans and build resilience and motivation (DWP, 2016). The use of specialist tools is therefore to be considered as part of the wider debate. The work ability index has been increasingly used as a tool for coaching employees in Finland and some larger Finnish organisations now employ work ability coaches to act as a key link between the employee, employer, and occupational health. There is currently very little empirical evidence for the utility of the approach, but results of an exploratory study in the UK indicate that personal work coaching improved the work ability of people experiencing homelessness (Hoven, Ford, Willmot, Hagan, & Siegrist, 2016) and there were high satisfaction rates of a social work service approach within occupational health services among a high proportion of immigrant workers (Moshe et al., 2017). In line with examining different UK adaptations, modifications for work ability and an extension of the biopsychosocial approach, the author of this thesis will be visiting Finland during 2017 to explore the use of the work ability tool in the concept of work coaching.

6.14 Conclusion

Wellness and wellbeing are concepts that are slowly being encapsulated within occupational health terminology as organisations strive to capitalise on their human resource in the changing world of work. However, the traditional occupational approach to this new paradigm is not necessarily one of cause and effect (i.e. work causes disease) and so for many in the profession the biopsychosocial approach remains elusive and confusing. In addition, the ‘occupational health tools’ that can be offered to organisations are lacking, and so instead familiar reactive services to reduce organisational risk of sickness absence and stress are offered. For those who embrace the wellness culture, health promotion models remain the predominate strategy in which to improve and sustain employee health. However, as the literature review throughout this investigation has demonstrated, long term outcomes and sustainability is not consistent.

Despite making a number of important contributions to the work ability literature, with particular reference to the influence of personality, the current research suffered from limitations which should be considered when interpreting the current results. The author of this thesis encourages further studies and consequent development of practice to take these limitations into account, and to ensure that subsequent work ability research in the UK can continue in a progressive and strategic manner.

Findings from the current investigation encourage a dynamic psychological approach to screening and monitoring employees using a more modern work ability concept and, additionally, the evaluation of personal resources such as personality. A broader organisational health concept, which could provide information on cohorts of employees to inform targeted interventions, could have a major implication on practice. Which interventions to offer would require further research based on the concept of positive psychology and increasing resources, this in turn could then form the basis of health behaviour change to positively affect the organisational and individual indices examined in Study 2 and Study 3. For occupational health professionals, there is a training requirement not only related to concepts of work ability, as identified in Study 1, but also on the changes necessary to replace traditional ways of working within the model of a biomedical approach. A new holistic model of occupational health incorporating the positive aspects of work within a life course approach and examination of different ways to inform work ability in future professional practice is therefore proposed.

References

- Abikoye, G. E., & Sholarin, A. A. (2012). Core-self evaluations and psychological health among caregivers of psychiatric patients in south-western Nigeria. *International Journal of Applied Science and Technology*, 2, 67-72.
- Abikoye, G. E. (2007). Core self-evaluations and workplace wellbeing among health workers in selected private hospitals in Ibadan. *African Journal for the Psychological Study of Social Issues*, 10(1), 197-207.
- Adams A.S., Soumerai, S.B., Lomas, J., & Ross-Degnan, D. (1999). Evidence of self-report bias in assessing adherence to guidelines. *International Journal for Quality in Health Care*. 11(3), 187–192.
- Addley, K., Boyd, S., Kerr, R., McQuillan, P., Houdmont, J., & McCrory, M. (2014). The impact of two workplace-based health risk appraisal interventions on employee lifestyle parameters, mental health and work ability: results of a randomised controlled trial. *Health Education Research*, 1-12.
- Advisory, Conciliation and Arbitration Service (ACAS). 2011. *The People Factor – engage your employees for business success*. Retrieved from: <http://www.acas.org.uk/index.aspx?articleid=3408>.
- Advisory, Conciliation and Arbitration Service (ACAS). 2014. *A Guide for Employers and Employees – Age and the workplace*. Retrieved from: www.acas.org.uk/media/pdf/e/4/Age-and-the-workplace-guide.pdf.
- Ahlstrom, L., Grimby-Ekman, A., Hagberg, M., Dellve, L. (2010). The work ability index and single item question: Associations with sick leave, symptoms and health – a prospective study of women on long term sick leave. *Scandinavian Journal of Work, Environment & Health*, 36(5), 404-412.

- Airila, A., Hakanen, J., Punakallio, A., Lusa, S., & Luukkonen, R. (2012). Is work engagement related to work ability beyond working conditions and lifestyle factors? *International Archives of Occupational and Environmental Health*, 85, 915-925.
- Airila, A., Hakanen, J. J., Schaufeli, W. B., Luukkonen, R., Punakallio, A., & Lusa, S. (2014). Are job and personal resources associated with work ability 10 years later? The mediating role of work engagement. *Work & Stress*, 28(1), 87-105.
- Alarcon, G., Eschleman, K. J., & Bowling, N. A. (2009). Relationships between personality variables and burnout: A meta-analysis. *Work & Stress*, 23(3), 244-263.
- Alavinia, S. M., van Duivenbooden, C., & Burdorf, A. (2007). Influence of work-related factors and individual characteristics on work ability among Dutch construction workers. *Scandinavian Journal of Work, Environment & Health*, 351-357.
- Allebeck, P., & Mastekaasa, A. (2004). Causes of sickness absence: research approaches and explanatory models. *Scandinavian Journal of Public Health*, 32(63 suppl), 36-43.
- American Psychological Association. (n.d.). Retrieved from <http://www.apa.org/topics/personality/>.
- Andrén, D. (2001). *Work, sickness, earnings, and early exits from the labor market. An Empirical Analysis Using Swedish Longitudinal Data*. Department of Economics, Göteborg University, Economic Studies 107, 1-244
- Asgari, A. (2013). Core self-evaluations, general health and stress among college students. *International Journal of Research in Organisational Behaviour and Human Resource Management*, 1(4), 230-241.
- Bailey, K. (2008). The use of evidence-based clinical tools in occupational medicine. *Occupational Medicine*. 58, 556-560.
- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, 22, 309-328.

- Bakker, A. B., Tims, M., & Derks, D. (2012). Proactive personality and job performance: The role of job crafting and work engagement. *Human Relations, 65*(10), 1359-1378.
- Ballard, J., & Coomer, K. (2016). The state of OH nursing: a national survey of occupational health nurses. *Occupational Health [at Work], 13*(3), 17–28.
- Ballard, J., & Ghani, R. (2015). Professional practice survey, 2015. *Occupational Health [at Work], 11*(5), 17-26.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Macmillan.
- Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., Martin, B. W., & Lancet Physical Activity Series Working Group. (2012). Correlates of physical activity: Why are some people physically active and others not? *The Lancet, 380*(9838), 258-271.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*(1), 1-26.
- Barrick, M. R., Mount, M. K., & Strauss, J. P. (1994). Antecedents of involuntary turnover due to a reduction in force. *Personnel Psychology, 47*(3), 515-535.
- Barrick, M. R., Stewart, G. L., & Piotrowski, M. (2002). Personality and job performance: Test of the mediating effects of motivation among sales representatives. *Journal of Applied Psychology, 87*(1), 43-48.
- Bartram, D. (2005). The great eight competencies: A criterion-centric approach to validation. *Journal of Applied Psychology, 90*(6), 1185 - 1203.
- Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations, 61*, 1139-1160.
- Bell, S. T. (2007). Deep-level composition variables as predictors of team performance: A meta-analysis. *Journal of Applied Psychology, 92*(3), 595 – 615.

- Best, R. G., Stapleton, L. M., & Downey, R. G. (2005). Core self-evaluations and job burnout: the test of alternative models. *Journal of Occupational Health Psychology, 10*, 441-451.
- Bethge, M., & Radoschewski, F. M. (2010). Physical and psychosocial work stressors, health-related control beliefs and work ability: Cross-sectional findings from the German Sociomedical Panel of Employees. *International Archives of Occupational and Environmental Health, 83*, 241-250.
- Bevan, S. (2003). *Attendance management*. Work Foundation.
- Black, C. M. (2008). *Working for a healthier tomorrow: Dame Carol Black's review of the health of Britain's working age population*. The Stationery Office. Retrieved from Public Health England: <https://www.gov.uk/.../hwwb-working-for-a-healthier-tomorrow.pdf>.
- Bolger, N., & Schilling, N. B. E. A. (1991). Personality and the problems in everyday life: The role of neuroticism in exposure and reactivity to daily stressors. *Journal of Personality, 59*(3), 356-386.
- Bolton, L. R., Becker, L. K., & Barber, L. K. (2010). Big Five trait predictors of differential counterproductive work behaviour dimensions. *Personality and Individual Differences, 49*(5), 537-541.
- Bono, J. E., & Judge, T. A. (2003). Core self-evaluations: A review of the trait and its role in job satisfaction and job performance. *European Journal of Personality, 17*(S1), S5-S18.
- Boorman, S. (2009). *The Final Report of the independent NHS Health and Wellbeing review*. Department of Health. Retrieved from NHS Health at Work: <http://www.nhshealthatwork.co.uk/health-work-wellbeing.asp>

- Borman, W. C. (2004). Introduction to the special issue: Personality and the prediction of job performance: More than the Big Five. *Human Performance*, 17(3), 267-269.
- Boschman, J. S., van der Molen, H. F., Frings-Dresen, M. H. W., & Sluiter, J. K. (2014). The impact of common mental disorders on work ability in mentally and physically demanding construction work. *International Archives of Occupational and Environmental Health*, 87(1), 51-59.
- Boström, M., Sluiter, J. K., & Hagberg, M. (2012). Changes in work situation and work ability in young female and male workers. A prospective cohort study. *BMC Public Health*, 12(1), 694-707.
- Bowling, A. (2005). Just one question: If one question works, why ask several? *Journal of Epidemiology and Community Health*, 59(5), 342-345.
- Bowling, A., & Ebrahim, S. (2005). *Handbook of health research methods: Investigation, measurement and analysis*. McGraw-Hill Education (UK).
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Braathen, T. N., Veiersted, K. B., & Heggnes, J. (2007). Improved work ability and return to work following vocational multidisciplinary rehabilitation of subjects on long term sick leave. *Journal of Rehabilitation Medicine*, 39(6), 493-499.
- Brešić, J., Knežević, B., Milošević, M., Tomljanović, T., Golubović, R., & Mustajbegović, J. (2007). Stress and work ability in oil industry workers. *Archives of Industrial Hygiene and Toxicology*, 58(4), 399-405.
- Bridger R. S., & Bennett A. I. (2011). Age and BMI interact to determine work ability in seafarers. *Occupational Medicine*, 61, 157–162.
- British Telecom. (2007). Flexible Working: Can your company compete without it?
Retrieved from: https://www2.bt.com/static/i/media/pdf/flex_working_wp_07.pdf.

- British Psychological Society (2009). *Code of Ethics and Conduct*. London, British Psychological Society.
- Brouwer, A. M., van Schaik, M. G., Korteling, J. H., van Erp, J. B., & Toet, A. (2015). Neuroticism, extraversion, conscientiousness and stress: Physiological correlates. *IEEE Transactions on Affective Computing*, *6*(2), 109-117.
- Brunborg, G. S. (2008). Core self-evaluations. *European Psychologist*, *13*, 96-102.
- Bugajska, J., & Łastowiecka, E. (2005). Life style, work environment factors and work ability in different occupations. *International Congress Series Vol. 1280*, 247-252. Elsevier.
- Burdorf, A. (2007). Economic evaluation in occupational health—its goals, challenges, and opportunities. *Scandinavian Journal of Work, Environment & Health*, *33*, 161-164.
- Carlsen, K., Jensen, A. J., Rugulies, R., Christensen, J., Bidstrup, P. E., Johansen, C., ... & Dalton, S. O. (2013). Self-reported work ability in long term breast cancer survivors: A population-based questionnaire study in Denmark. *Acta Oncologica*, *52*(2), 423-429.
- Cattell, R. B. (1965). *The scientific analysis of personality*. Baltimore, MD: Penguin.
- Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, *61*, 679-704.
- Chang, C.-H., Ferris, D. L., Johnson, R. E., Rosen, C. C., & Tan, J. A. (2012). Core self-evaluations: A review and evaluation of the literature. *Journal of Management*, *38*, 81–128.
- Chartered Institute of Personnel and Development (CIPD). (Dec, 2012). *Managing for Sustainable Employee Engagement: Guidance for employers and managers*. Retrieved from: www.cipd.co.uk.

Chartered Institute of Personnel and Development (CIPD). (2015a). *Absence management survey report*. Retrieved from: <https://www.cipd.co.uk/hr-resources/survey-reports/absence-management-2015.aspx>.

Chartered Institute of Personnel and Development (CIPD). (2015b). *Managing an age-diverse workforce: What employers need to know*. Retrieved from: www.cipd.co.uk

Chartered Institute of Personnel and Development (CIPD). (2015c). *Avoiding the Demographic Crunch: Labour supply and the ageing workforce*. Retrieved from: www.cipd.co.uk

Chen, G. (2011). Evaluating the core: critical assessment of core self-evaluations theory. *Journal of Organizational Behaviour*, 33(2), 153-160.

Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods*, 4(1), 62-83.

Cho, Y. I., Johnson, T. P., & Van Geest, J. B. (2013). Enhancing surveys of health care professionals: A meta-analysis of techniques to improve response. *Evaluation & the Health Professions*, 36(3), 382-407.

Clark, D. M. (2011). Implementing NICE guidelines for the psychological treatment of depression and anxiety disorders: the IAPT experience. *International Review of Psychiatry*, 23(4), 318-327.

Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology*, 103(1), 103.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences*. (2nd ed). New Jersey: Lawrence Erlbaum.

Cohrs, J. C., Abele, A. E., & Dette, D. E. (2006). Integrating situational and dispositional determinants of job satisfaction: Findings from three samples of professionals. *The Journal of Psychology*, 140(4), 363-395.

- Confederation of British Industry. (2014). *Getting better - workplace health as a business issue*. Retrieved from CBI: www.cbi.org.uk/media/2727613/getting-better.pdf.
- Coomer, K., & Houdmont, J. (2013). Occupational health professionals' knowledge, understanding and use of work ability. *Occupational Medicine*, *63*(6), 405-409.
- Cloostermans, L., Bekkers, M. B., Uiters, E., & Proper, K. I. (2014). The effectiveness of interventions for ageing workers on (early) retirement, work ability and productivity: A systematic review. *International Archives of Occupational and Environmental Health*, 1-12.
- Costa Jr, P. T., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using the revised NEO personality inventory. *Journal of Personality Assessment*, *64*(1), 21-50.
- Costa, G., & Sartori, S. (2007). Ageing, Working Hours and Work Ability. *Ergonomics*, *50*(11), 1914-1930.
- Costa, G., Sartori, S., Bertoldo, B., Olivato, D., Antonacci, G., Ciuffa, V., & Mauli, F. (2005). Work ability in health care workers. In *International Congress Series*. Vol. 1280, 264-269.
- Cox, T., Griffiths, A., & Rial-González, E. (2000). *Research on work-related stress: European Agency for Safety and Health at Work*. 1-167. Retrieved from: <https://osha.europa.eu/en/tools-and-publications/publications/reports/203>
- Crawford, J. O. (2016). Older workers—workplace health evidence-based practice? *Occupational Medicine*, *66*, 424-425.
- Daniels, K. (2004). Perceived risk from occupational stress: A survey of 15 European countries. *Occupational and Environmental Medicine*, *61*(5), 467-470.
- Daniels, K., & Guppy, A. (1994). Occupational stress, social support, job control, and psychological wellbeing. *Human Relations*, *47*(12), 1523-1544.

- Davis-Blake, A., & Pfeffer, J. (1989). Just a mirage: The search for dispositional effects in organizational research. *Academy of Management Review*, 14(3), 385-400.
- Denissen, J. J., Geenen, R., Van Aken, M. A., Gosling, S. D., & Potter, J. (2008). Development and validation of a Dutch translation of the Big Five Inventory (BFI). *Journal of Personality Assessment*, 90(2), 152-157.
- De Beuckelaer, A., & Lievens, F. (2009). Measurement equivalence of paper-and-pencil and Internet organisational surveys: A large scale examination in 16 countries. *Applied Psychology*, 58(2), 336-361.
- Dekkers-Sánchez, P. M., Wind, H., Sluiter, J. K., & Frings-Dresen, M. H. (2013). What factors are most relevant to the assessment of work ability of employees on long term sick leave? The physicians' perspective. *International Archives of Occupational and Environmental Health*, 86(5), 509-518.
- De Lange, A. H., Taris, T. W., Kompier, M. A., Houtman, I. L., & Bongers, P. M. (2004). The relationships between work characteristics and mental health: Examining normal, reversed and reciprocal relationships in a 4-wave study. *Work & Stress*, 18(2), 149-166.
- De Zwart, B. C. H., Frings-Dresen, M. H. W., & Van Duivenbooden, J. C. (2002). Test-retest reliability of the Work Ability Index questionnaire. *Occupational Medicine*, 52(4), 177-181.
- Department of Work & Pensions. (DWP) (2015a). *Help and Support for Older Workers*. Retrieved from: <https://www.gov.uk/government/publications/help-and-support-for-older-workers/help-and-support-for-older-workers>.
- Department for Work & Pensions. (DWP) (2015b). *Fit for Work – Guidance for Employers*. Retrieved from: <https://www.gov.uk/government/collections/fit-for-work-guidance>.

- Department for Work and Pensions. (DWP) (2014). *State Age Pension Timetable*. Retrieved from: <https://www.gov.uk/government/state-pension-age-timetable>.
- Department for Work & Pensions. (DWP) (2016). *The work health and disability green paper*. Retrieved from: <https://www.gov.uk/government/consultations/work-health-and-disability-improving-lives>
- De Vos, A., & Soens, N. (2008). Protean attitude and career success: The mediating role of self-management. *Journal of Vocational Behavior*, 73(3), 449-456.
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41(1), 417-440.
- Di Sanza, C. (2010). *Work, personality and psychological distress: Direct and moderating effects of the Big Five personality traits*. (Master thesis). Retrieved from: <https://papyrus.bib.umontreal.ca/xmlui/handle/1866/4785>.
- Dodd, N. M., & Snelgar, R. (2013). Zulu Youth's Core Self-evaluations and Academic Achievement in South Africa: An Exploratory Study. *Journal of Psychology*, 4(2), 101-107.
- Doyle, C, E. (2003). *Work and Organisational Psychology: An introduction with attitude*. Taylor & Francis, Hove.
- Edlund, M., Gerhardsson, L., & Hagberg, M. (2012). Physical capacity and psychological mood in association with self-reported work ability in vibration-exposed patients with hand symptoms. *Journal of Occupational Medicine Toxicology*, 7, 1-7.
- Edwards, P., Roberts, I., Clarke, M., DiGuseppi, C., Pratap, S., Wentz, R., & Kwan, I. (2002). Increasing response rates to postal questionnaires: Systematic review. *British Medical Journal*, 324, 1183–1193.
- Edwards, P., Roberts, I., Sandercock, P., & Frost, C. (2004). Follow-up by mail in clinical trials: does questionnaire length matter? *Controlled Clinical Trials*, 25, 31–52.

- El Fassi, M., Bocquet, V., Majery, N., Lair, M. L., Couffignal, S., & Mairiaux, P. (2013). Work ability assessment in a worker population: comparison and determinants of Work Ability Index and Work Ability score. *BMC Public Health*, *13*(1), 305.
- Elo, A. L., Leppänen, A., & Jahkola, A. (2003). Validity of a single item measure of stress symptoms. *Scandinavian Journal of Work, Environment & Health*, *29*, 444-451.
- Engel, G. L. (1977). The need for a new medical model: a challenge for biomedicine. *Science*, *196*(4286), 129-136.
- Erez, A., & Judge, T. A. (2001). Relationship of core self-evaluations to goal setting, motivation, and performance. *Journal of Applied Psychology*, *86*(6), 1270 - 1279.
- Eskelinen, L., Kohvakka, A., Merisalo, T., Hurri, H., & Wägar, G. (1991). Relationship between the self-assessment and clinical assessment of health status and work ability. *Scandinavian Journal of Work, Environment & Health*, 40-47.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1-4.
- European Commission. (2014). *Population ageing in Europe – Facts, Implications and Policies*. Retrieved from: <https://ec.europa.eu/research/social-sciences/pdf/.../kina26426enc.pdf>.
- European Commission. (2005). *The New SME Definition: User Guide and Model Declaration*. Brussels, Belgium. Enterprise & Industry Publications.
- Ewles, L., & Simnett, I. (2003). *Promoting health: A practical guide*. London: Baillière Tindall.
- Faculty of Occupational Medicine. (2004). *Position Paper on Age and Employment*. Retrieved from <https://www.fom.ac.uk>.

- Faculty of Occupational Medicine. (2010). *Future Directions for Occupational health Care in the UK*. Retrieved from: <http://www.fom.ac.uk>.
- Faculty of Occupational Medicine. (2012). *Guidance on Ethics for Occupational Health Practice*, 7th ed. London: Royal College of Physicians.
- Fadyl, J. K., Mcpherson, K. M., Schlüter, P. J., & Turner-Stokes, L. (2010). Factors contributing to work-ability for injured workers: Literature review and comparison with available measures. *Disability and Rehabilitation*, *32(14)*, 1173-1183.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behaviour Research Methods*, *39(2)*, 175-191.
- Faragher, E. B., Cass, M., & Cooper, C. L. (2005). The relationship between job satisfaction and health: A meta-analysis. *Occupational and Environmental Medicine*, *62(2)*, 105-112.
- Feldt, T., Hyvönen, K., Oja-Lipasti, T., Kinnunen, U., & Salmela-Aro, K. (2012). Do work ability and job involvement channel later personal goals in retirement? An 11-year follow-up study. *International Archives of Occupational and Environmental Health*, *85(5)*, 547-558.
- Ferris, D. L., Rosen, C. R., Johnson, R. E., Brown, D. J., Risavy, S. D., & Heller, D. (2011). Approach or avoidance (or both?): Integrating core self-evaluations within an approach/avoidance framework. *Personnel Psychology*, *64(1)*, 137-161.
- Fichera, G. P., Neri, L., Sartori, S., & Costa, G. (2009). Workplace trauma exposure, emotional imbalance and work ability. In M. Kumashiro (Ed.), *Promotion of Work Ability Towards Productive Aging* (pp 93). Selected papers of the 3rd International Symposium on Work Ability. CRC Press.

- Flannery, K., Resnick, B., & McMullen, T. L. (2012). The impact of the worksite heart health improvement project on work ability: A pilot study. *Journal of Occupational and Environmental Medicine*, *54*, 1406-1412.
- Flynn, M., & McNair, S. (2007). *Managing age – a guide to good employment practice*. Chartered Institute of Personnel and Development. Retrieved from: www.cipd.co.uk
- Flynn, M., & Houston, K. (2015). *A Guide for Employers: Managing healthy ageing workforces: A small and medium sized enterprise business imperative*. The Centre for Research into the Older Workforce. Retrieved from: <http://www.agediversity.org>
- Ford, M. T., Matthews, R. A., Wooldridge, J. D., Mishra, V., Kakar, U. M., & Strahan, S. R. (2014). How do occupational stressor-strain effects vary with time? A review and meta-analysis of the relevance of time lags in longitudinal studies. *Work & Stress*, *28*(1), 9-30.
- Fossati, A., Borroni, S., Marchione, D., & Maffei, C. (2011). The Big Five inventory (BFI). *European Journal of Psychological Assessment*, *27*, 50-58.
- Fredrickson, B. L. (2004). The broaden-and-build theory of positive emotions. *Philosophical Transactions-Royal Society of London Series Biological Sciences*, *(359)*, 1367-1378.
- Freude, G., Seibt, R., Pech, E., & Ullsperger, P. (2005). Assessment of work ability and vitality – a study of teachers of different age groups. In *International Congress Series* Vol. 1280, 270-274.
- Frese, M., & Fay, D. (2001). Personal initiative: An active performance concept for work in the 21st century. *Research in Organizational Behaviour*, *23*, 133-187.
- Furnham, A. (2008). *Personality and intelligence at work*. London, Routledge.
- Furnham, A., Eracleous, A., & Chamorro-Premuzic, T. (2009). Personality, motivation and job satisfaction: Herzberg meets the Big Five. *Journal of Managerial Psychology*, *24*(8), 765-779.

- Galvin, J., & Smith, A. P. (2015). Stress in UK mental health training: A multidimensional comparison study. *British Journal Education, Society & Behavioural Science*, 9(3), 161-175.
- Gamperiene, M., Nygard, J. F., Sandanger, I., Lau, B., & Bruusgaard, D. (2008). Self-reported work ability of Norwegian women in relation to physical and mental health, and to the work environment. *Journal of Occupational Medicine and Toxicology*, 3(8), 1-9.
- Geissler, H., Tempel, J., & Geissler-Gruber, B. (2005, June). Can the Work Ability Index also be used by non-medical professionals? A comparative study. *International Congress Series Vol. 1280*, 281-285. Elsevier.
- Geukes, M., van Aalst, M. P., Nauta, M. C., & Oosterhof, H. (2012). The impact of menopausal symptoms on work ability. *Menopause*, 19(3), 278-282.
- Geurts, S. A., & Sonnentag, S. (2006). Recovery as an explanatory mechanism in the relation between acute stress reactions and chronic health impairment. *Scandinavian Journal of Work, Environment & Health*, 32(6), 482-492.
- Goedhard, R. G., & Goedhard, W. J. (2005, June). Work ability and perceived work stress. In *International Congress Series Vol. 1280*, 79-83. Elsevier.
- Gold, M., & Fraser, J. (2002). Managing self-management: Successful transitions to portfolio careers. *Work, Employment & Society*, 16(4), 579-597.
- Goldberg, D. P., & Williams, P. A. (1988). *User's Guide to the GHQ*. Windsor, NFER Nelson.
- Goldberg, D. P., Gater, R., Sartorius, N., Ustun, T., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, 27, 191-197.

- Golubic, R., Milosevic, M., Knezevic, B., & Mustajbegovic, J. (2009). Work-related stress, education and work ability among hospital nurses. *Journal of Advanced Nursing*, *65*(10), 2056-2066.
- Gould, R., Ilmarinen, J., Järvisalo, J., & Koskinen, S. (2008). *Dimensions of work ability: Results of the Health 2000 Survey*. Helsinki; Finnish Centre of Pensions, The Social Insurance Institution, National Public Health Institute, Finnish Institute of Occupational Health.
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504-528.
- Gram, B., Holtermann, A., Bültmann, U., Sjøgaard, G., & Sjøgaard, K. (2012). Does an exercise intervention improving aerobic capacity among construction workers also improve musculoskeletal pain, work ability, productivity, perceived physical exertion, and sick leave? A randomised controlled trial. *Journal of Occupational and Environmental Medicine*, *54*, 1520-1526.
- Grandey, A. A. (2000). Emotional regulation in the workplace: A new way to conceptualize emotional labour. *Journal of Occupational Health Psychology*, *5*(1), 95-110.
- Grant, S., & Langan-Fox, J. (2006). Occupational stress, coping and strain: The combined/interactive effect of the Big Five traits. *Personality and Individual Differences*, *41*(4), 719-732.
- Grant, A. M., & Wrzesniewski, A. (2010). I won't let you down... or will I? Core self-evaluations, other-orientation, anticipated guilt and gratitude, and job performance. *Journal of Applied Psychology*, *95*(1), 108-121.
- Greaves, C. E., Parker, S. L., Zacher, H., & Jimmieson, N. L. (2017). Working mothers' emotional exhaustion from work and care: The role of core self-evaluations, mental health, and control. *Work & Stress*, 1-18.

- Guidi, S., Bagnara, S., & Fichera, G. P. (2012). The HSE indicator tool, psychological distress and work ability. *Occupational Medicine*, kqs021.
- Guido, G., Peluso, A. M., Capestro, M., & Miglietta, M. (2015). An Italian version of the 10 item Big Five Inventory: An application to hedonic and utilitarian shopping values. *Personality and Individual Differences*, 76, 135-140.
- Gupta, N., & Beehr, T. A. (1982). A test of the correspondence between self-reports and alternative data sources about work organizations. *Journal of Vocational Behavior*, 20(1), 1-13.
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, 43(6), 495-513.
- Hakanen, J. J., Seppälä, P., & Peeters, M. C. (2017). High Job Demands, Still Engaged and Not Burned Out? The Role of Job Crafting. *International Journal of Behavioral Medicine*, 1-9.
- Halonen, J. I., Solovieva, S., Pentti, J., Kivimäki, M., Vahtera, J., & Viikari-Juntura, E. (2016). Effectiveness of legislative changes obligating notification of prolonged sickness absence and assessment of remaining work ability on return to work and work participation: A natural experiment in Finland. *Occupational and Environmental Medicine*, 73(1), 42-50.
- Hankins, M. (2008). The reliability of the twelve item general health questionnaire (GHQ-12) under realistic assumptions. *BMC Public Health*, 8.
- Harju, L., Hakanen, J. J., & Schaufeli, W. B. (2014). Job boredom and its correlates in 87 Finnish organizations. *Journal of Occupational and Environmental Medicine*, 56(9), 911-918.

- Harrison, J. (2014). *Planning the Future: Delivering a vision of good work and health in the UK for the next 5-20 years and the professional resources to deliver it*. Council for Work & Health. Retrieved from www.councilforworkandhealth.org.uk
- Harrison, J. (2016). *Planning the future: Implications for occupational health: Delivery and training*. Council for Work & Health. Retrieved from www.councilforworkandhealth.org.uk
- Hart, J., & Furnham, A. (2016). Personality and Performance in Eventing. *Psychology*, 7(10), 1267-1275.
- Hasselhorn, H. M. (2008). *Work ability-concept and assessment*. Germany: University of Wuppertal.
- Hasselhorn, H. M., Müller, B. H., Freude, G., Tempel, J., & Kaluza, S. (2005). The Work Ability Index (WAI) – establishment of a German WAI-network. In *International Congress Series. Vol. 1280*, 292-295. Elsevier.
- Havelka, M., Despot Lučanin, J., & Lučanin, D. (2009). Biopsychosocial model—the integrated approach to health and disease. *Collegium Antropologicum*, 33(1), 303-310.
- Health and Safety Executive (HSE), (2007). *Managing the Causes of Work-related Stress: A Step by Step Approach Using the Management Standards*. HSG 218.
- Heller, D., Judge, T. A., & Watson, D. (2002). The confounding role of personality and trait affectivity in the relationship between job and life satisfaction. *Journal of Organizational Behavior*, 23(7), 815-835.
- Hilbert, A., Braehler, E., Haeuser, W., & Zenger, M. (2014) Weight bias internalization, core self-evaluation and health in overweight and obese persons. *Obesity*, 22(1), 79-85.

- Hillage, J., Brown, G., Shiels, C., & Gabbay, M. (2014). *Exploring future GP referral to fit for work*. Retrieved from the Department of Work and Pensions: <https://www.gov.uk/.../fit-for-work-exploring-future-gp-referrals>.
- Hiller, N. J., & Hambrick, D. C. (2005). Conceptualizing executive hubris: The role of (hyper-) core self-evaluations in strategic decision-making. *Strategic Management Journal*, 26(4), 297-319.
- Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44(3), 513.
- Holt, D. T., & Jung, H. H. (2008). Development of a Korean version of a core self-evaluations scale. *Psychological Reports*, 103(2), 415-425.
- Hoonakker, P., & Van Duivenbooden, C. (2012). Predicting long term absenteeism from work in construction industry: A longitudinal study. *A Journal of Prevention, Assessment and Rehabilitation*, 41, 3765-3770.
- Hotard, S. R., McFatter, R. M., McWhirter, R. M., & Stegall, M. E. (1989). Interactive effects of extraversion, neuroticism, and social relationships on subjective wellbeing. *Journal of Personality and Social Psychology*, 57(2), 321.
- Houdmont, J., Cox, T., & Griffiths, A. (2010). Work-related stress case definitions and prevalence rates in national surveys. *Occupational Medicine*, 60, 658-661.
- Houdmont, J., Kerr, R., & Addley, K. (2012). Psychosocial factors and economic recession: the Stormont Study. *Occupational Medicine*, 62, 98-104.
- Houdmont, J., Kerr, R., & Randall, R. (2012). Organisational psychosocial hazard exposures in UK policing: Management Standards Indicator Tool reference values. *Policing: An International Journal of Police Strategies & Management*, 35, 182-197.

- Houdmont, J., Randall, R., Kerr, R., & Addley, K. (2013). Psychosocial risk assessment in organizations: Concurrent validity of the brief version of the Management Standards Indicator Tool. *Work & Stress*, 27, 403-412.
- Hoven, H., Ford, R., Willmot, A., Hagan, S., & Siegrist, J. (2016). Job coaching and success in gaining and sustaining employment among homeless people. *Research on Social Work Practice*, 26(6), 668-674.
- Huelsman, T. J., Munz, D. C., & Furr, R. M. (2003). The role of affect as a mediator variable: an application to organizational psychology. *Individual Differences Research*, 1, 173–188.
- Hurtz, G. M., & Donovan, J. J. (2000). Personality and job performance: The Big Five revisited. *Journal of Applied Psychology*, 85(6), 869-879.
- Illich, I. (1976). *Medical nemesis: The expropriation of health*. Marion Boyars Publishers, London.
- Ilmarinen, J. (2001). Aging workers. *Occupational & Environmental Medicine*, 58(8), 546-552.
- Ilmarinen, J. (2009). Work ability – a comprehensive concept for occupational health research and prevention. *Scandinavia Journal of Work, Environment & Health*, 1-5.
- Ilmarinen, J. (2011). 30 years' work ability and 20 years age management. In: *Age Management During the Life Course – Proceedings of the 4th Symposium on Work Ability*. Tampere University Press, 12-22.
- Ilmarinen, J. (2013). *An essay on longer working life*. Pensionsåldersutredningen.
- Ilmarinen, V., Ilmarinen, J., Huuhtanen, P., Louhevaara, V., & Näsman, O. (2015). Examining the factorial structure, measurement invariance and convergent and discriminant validity of a novel self-report measure of work ability: Work ability–personal radar. *Ergonomics*, 1-16.

- Ilmarinen, J., & Tuomi, K. (2004). Past, present and future of work ability. *Proceedings of the 1st International Symposium on Work Ability*, Helsinki.
- Ilmarinen, J., Tuomi, K., Eskelinen, L., Nygård, C. H., Huuhtanen, P., & Klockars, M. (1991). Background and objectives of the Finnish research project on aging workers in municipal occupations. *Scandinavian Journal of Work, Environment & Health*, 17, 7-11.
- Ilmarinen, J., Tuomi, K., & Klockars, M. (1997). Changes in the work ability of active employees over an 11-year period. *Scandinavian Journal of Work, Environment & Health*, 49-57.
- Ilmarinen J., Tuomi K., Seitsamo J. (2005). New dimensions of work ability. *International Congress Series 1280*, 3-7. Elsevier.
- Inceoglu, I., & Warr, P. (2011). Person-job fit, Job Engagement and Job Satisfaction. *DOP conference*.
- International Labour Office. (2012). *Stress prevention at work checkpoints: Practical improvements for stress prevention in the workplace*. Geneva, International Labour Office.
- Iqbal, Y. (2012). Impact of core self-evaluation (CSE) on job satisfaction in education sector of Pakistan. *Journal of Global Strategic Management*, 12.
- Irvine, A. (2011). Something to declare? The disclosure of common mental health problems at work. *Disability & Society*, 26(2), 179-192.
- Jääskeläinen, A., Kausto, J., Seitsamo, J., Ojajarvi, A., Nygård, C. H., Arjas, E., & Leino-Arjas, P. (2016). Work ability index and perceived work ability as predictors of disability pension: A prospective study among Finnish municipal employees. *Scandinavian Journal of Work, Environment & Health*, 42(6), 490-499.

- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five trait taxonomy. *Handbook of personality: Theory and research*, 3, 114-158.
- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of personality: Theory and research*, 2, 102-138.
- Johnson, R. E., Rosen, C. C., & Levy, P. E. (2008). Getting to the core of core self-evaluation: A review and recommendations. *Journal of Organizational Behavior*, 29(3), 391-413.
- Joiner, T. A. (2001). The influence of national culture and organizational culture alignment on job stress and performance: evidence from Greece. *Journal of Managerial Psychology*, 16(3), 229-242.
- Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits—self-esteem, generalised self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology*, 86, 80-92.
- Judge, T. A., Bono, J. E., & Locke, E. A. (2000). Personality and job satisfaction: The mediating role of job characteristics. *Journal of Applied Psychology*, 85(2), 237.
- Judge, T. A., Bono, J. E., Erez, A., & Locke, E. A. (2005). Core self-evaluations and job and life satisfaction: The role of self-concordance and goal attainment. *Journal of Applied Psychology*, 90(2), 257.
- Judge, T. A., Erez, A., & Bono, J. E. (1998a). The power of being positive: The relation between positive self-concept and job performance. *Human Performance*, 11(2-3), 167-187.
- Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2003). The core self-evaluations scale: Development of a measure. *Personnel Psychology*, 56, 303-331.

- Judge, T.A., Heller, D. & Mount, M.K. (2002). Five-factor model of personality and job satisfaction: A meta-analysis. *Journal of Applied Psychology*, 87, 530-41.
- Judge, T. A., & Hurst, C. (2007). Capitalizing on one's advantages: Role of core self-evaluations. *Journal of Applied Psychology*, 92(5), 1212-1227.
- Judge, T. A., & Kammeyer-Mueller, J. D. (2011). Implications of core self-evaluations for a changing organizational context. *Human Resource Management Review*, 21, 331-341.
- Judge, T. A., Locke, E. A., & Durham, C. C. (1997a). The dispositional causes of job satisfaction: A core evaluations approach. *Research in Organisational Behaviour*, 19, 151-188.
- Judge, T. A., Locke, E. A., Durham, C. C., & Kluger, A. N. (1998b). Dispositional effects on job and life satisfaction: the role of core evaluations. *Journal of Applied Psychology*, 83, 17-34.
- Judge, T. A., Martocchio, J. J., & Thoresen, C. J. (1997). Five-factor model of personality and employee absence. *Journal of Applied Psychology*, 82(5), 745-755.
- Judge, T. A., Van Vianen, A. E., & De Pater, I. E. (2004). Emotional stability, core self-evaluations, and job outcomes: A review of the evidence and an agenda for future research. *Human Performance*, 17(3), 325-346.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, 33(4), 692-724.
- Kahn, R. L., & Byosiére, P. (1992). Stress in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology*, 2nd ed. (pp. 571-650). Palo Alto, CA: Consulting Psychologists Press.
- Kanfer, R., Frese, M., & Johnson, R. E. (2017). Motivation related to work: A century of progress. *Journal of Applied Psychology*, 102(3), 1 – 18.

- Karren, R. J., & Zacharias, L. (2007). Integrity tests: Critical issues. *Human Resource Management Review*, 17(2), 221-234.
- Kammeyer-Mueller, J. D., Judge, T. A., & Scott, B. A. (2009). The role of core self-evaluations in the coping process. *Journal of Applied Psychology*, 94, 177-195.
- Karasek Jr, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, 24, 285-308.
- Karasek, R.A., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York: Basic Books.
- Karlsson, M. L., Busch, H., Aboagye, E., & Jensen, I. (2015). Validation of a measure of health-related production loss: Construct validity and responsiveness-a cohort study. *BMC Public Health*, 15(1):1148, 1-10.
- Kaplowitz, M. D., Hadlock, T. D., & Levine, R. (2004). A comparison of web and mail survey response rates. *Public Opinion Quarterly*, 68(1), 94-101.
- Kerr, R., McHugh, M., & McCrory, M. (2009). HSE Management Standards and stress-related work outcomes. *Occupational Medicine*, 59(8), 574-579.
- Kernis, (2008). Toward a conceptualization of optimal self-esteem. *Psychological Inquiry*, 14(1), 1-26.
- Kim, H. J., Shin, K. H., & Swanger, N. (2009). Burnout and engagement: A comparative analysis using the Big Five personality dimensions. *International Journal of Hospitality Management*, 28(1), 96-104.
- Kinnunen-Amoroso, M., & Liira, J. (2013). Management of work-related stress by Finnish occupational physicians. *Occupational Medicine*, 63(5), 361-364.
- Kinnunen-Amoroso, M., & Liira, J. (2014). Finnish Occupational Health Nurses' View of Work-Related Stress: A Cross-Sectional Study. *Workplace Health & Safety*, 62(3), 105-112.

- Kirk, H. (2012). The role of advanced nursing practice in occupational health. *Occupational Medicine*, 62(7), 574-577.
- Kivimäki, M., Head, J., Ferrie, J. E., Shipley, M. J., Vahtera, J., & Marmot, M. G. (2003). Sickness absence as a global measure of health: Evidence from mortality in the Whitehall II prospective cohort study. *BMJ*, 327(7411), 364.
- Kloimüller, I., Karazman, R., Geissler, H., Karazman-Morawetz, I., & Haupt, H. (2000). The relation of age, work ability index and stress-inducing factors among bus drivers. *International Journal of Industrial Ergonomics*, 25, 497-502.
- Kloss, D. (2013). *Occupational Health Law*. John Wiley & Sons.
- Knekt, P., Lindfors, O., Härkänen, T., Välikoski, M., Virtala, E., Laaksonen, M. A., ... & Renlund, C. (2008). Randomised trial on the effectiveness of long-and short term psychodynamic psychotherapy and solution-focused therapy on psychiatric symptoms during a 3-year follow-up. *Psychological Medicine*, 38(05), 689-703.
- Knezevic, B., Milosevic, M., Golubic, R., Belosevic, L., Russo, A., & Mustajbegovic, J. (2011). Work-related stress and work ability among Croatian university hospital midwives. *Midwifery*, 27(2), 146-153.
- Kohn, M. L., & Schooler, C. (1982). Job conditions and personality: A longitudinal assessment of their reciprocal effects. *American Journal of Sociology*, 87, 1257-1286.
- Kok, A. A., Plaisier, I., Smit, J. H., & Penninx, B. W. (2017). The impact of conscientiousness, mastery, and work circumstances on subsequent absenteeism in employees with and without affective disorders. *BMC Psychology*, 5(1), 1-10.
- Koolhaas, W., van der Klink, J. J., Groothoff, J. W., & Brouwer, S. (2011). Towards a sustainable healthy working life: Associations between chronological age, functional age and work outcomes. *The European Journal of Public Health*, 22(3), 424-429.

- Kovaleva, A., Beierlein, C., Kemper, C. J., & Rammstedt, B. (2013). Psychometric properties of the BFI-K: A cross-validation study. *The International Journal of Educational and Psychological Assessment, 13*(1), 34 – 50.
- Kuijer, P. P. F., Gouttebarga, V., Wind, H., van Duivenbooden, C., Sluiter, J. K., & Frings-Dresen, M. H. (2012). Prognostic value of self-reported work ability and performance-based lifting tests for sustainable return to work among construction workers. *Scandinavian Journal of Work, Environment & Health, 600-603*.
- Kujala, V., Tammelin, T., Remes, J., Vammavaara, E., Ek, E., & Laitinen, J. (2006). Work ability index of young employees and their sickness absence during the following year. *Scandinavian Journal of Work, Environment & Health, 32*, 75-84.
- Labriola, M., Lund, T., & Burr, H. (2006). Prospective study of physical and psychosocial risk factors for sickness absence. *Occupational Medicine, 56*, 469-474.
- Langelaan, S., Bakker, A. B., Van Doornen, L. J., & Schaufeli, W. B. (2006). Burnout and work engagement: Do individual differences make a difference? *Personality and Individual Differences, 40*(3), 521-532.
- Larsson, A., Karlqvist, L., & Gard, G. (2008). Effects of work ability and health promoting interventions for women with musculoskeletal symptoms: A 9-month prospective study. *BMC Musculoskeletal Disorders, 9*(1), 105.
- Larsson, A., Karlqvist, L., Westerberg, M., & Gard, G. (2012). Identifying work ability promoting factors for home care aides and assistant nurses. *BMC Musculoskeletal Disorders, 13*, 1-11.
- Laschinger, H. K. S., Wong, C., McMahon, L., & Kaufmann, C. (1999). Leader behaviour impact on staff nurse empowerment, job tension, and work effectiveness. *Journal of Nursing Administration, 29*(5), 28-39.

- Lee, J. J., & Ok, C.M. (2015). Drivers of work engagement: An examination of core self-evaluations and psychological climate among hotel employees. *International Journal of Hospitality Management*, 44, 84-98.
- Lehtinen, S., & Rantanen, J. (2012). *National Profile of Occupational Health System in Finland*. Copenhagen. WHO Regional Office for Europe.
- Leijon, O., Balliu, N., Lundin, A., Vaez, M., Kjellberg, K., & Hemmingsson, T. (2017). Effects of psychosocial work factors and psychological distress on self-assessed work ability: A 7-year follow-up in a general working population. *American Journal of Industrial Medicine*, 60(1), 121-130.
- Leijten, F. R., van den Heuvel, S. G., Ybema, J. F., van der Beek, A. J., Robroek, S. J., & Burdorf, A. (2014). The influence of chronic health problems on work ability and productivity at work: a longitudinal study among older employees. *Scandinavian Journal of Work Environment & Health*, 40(5), 473-82.
- Leka, S., Jain, A., Iavicoli, S., Vartia, M., & Ertel, M. (2011). The role of policy for the management of psychosocial risks at the workplace in the European Union. *Safety Science*, 49(4), 558-564.
- Leka, S., Van Wassenhove, W., & Jain, A. (2015). Is psychosocial risk prevention possible? Deconstructing common presumptions. *Safety Science*, 71, 61-67.
- Lemelle, C. J., & Scielzo, S. A. (2012). How you feel about yourself can affect how you feel about your job: a meta-analysis examining the relationship of core self-evaluations and job satisfaction. *Journal of Business Diversity*, 12, 116-133.

- Leppanen, S., Pitkanen-Huhta, A., Nikula, T., Kytola S., Tormakangas, T., Nissinen, K., Kaanta, L.,...Jousmaki, H. (2001). *National Survey on the English Language in Finland: meaning and attitudes*. Retrieved from the Research Unit for the Study of Variation, Contacts and Change in English, University of Jyväskylä Finland: <https://www.jyu.fi/hum/laitokset/kielet/tutkimus/hankkeet/paattyneet-hankkeet/varieng/en/survey>.
- Lian, P., Sun, Y., Ji, Z., Li, H., & Peng, J. (2014). Moving away from exhaustion: How core self-evaluations influence academic burnout. *PLoS One*, *9*(1), 1-5.
- Liira, J., Matikainen, E., Leino-Arjas, P., Malmivaara, A., Mutanen, P., Rytönen, H., & Juntunen, J. (2000). Work ability of middle-aged Finnish construction workers – a follow-up study in 1991–1995. *International Journal of Industrial Ergonomics*, *25*(5), 477-481.
- Lin, S., Wang, Z., & Wang, M. (2006). Work ability of workers in western China: Reference data. *Occupational Medicine*, *56*(2), 89-93.
- Lindberg, P., Josephson, M., Alfredsson, L., & Vingård, E. (2006). Promoting excellent work ability and preventing poor work ability: The same determinants? Results from the Swedish HAKuL study. *Occupational and Environmental Medicine*, *63*(2), 113-120.
- Lindfors, P. M., Meretoja, O. A., Töyry, S. M., Luukkonen, R. A., Elovainio, M. J., & Leino, T. J. (2007). Job satisfaction, work ability and life satisfaction among Finnish anaesthesiologists. *Acta Anaesthesiologica Scandinavica*, *51*(7), 815-822.
- Liu, C., Li, C., Fan, J., & Nauta, M. M. (2015). Workplace conflict and absence/lateness: The moderating effect of core self-evaluation in China and the United States. *International Journal of Stress Management*. *22*(3), 243-269.
- Locke, E. A. (1976). *The nature and causes of job satisfaction*. Handbook of Industrial and Organizational Psychology, *1*, 1297-1343.

- Löve J, Holmgren K., Torén K., & Hensing G. (2012) Can work ability explain the social gradient in sickness absence: A study of a general population in Sweden. *BMC Public Health, 12*:163.
- Lund, D. B. (2003). Organizational culture and job satisfaction. *Journal of Business & Industrial Marketing, 18*(3), 219-236.
- Lundin, A., Kjellberg, K., Leijon, O., Punnett, L., & Hemmingsson, T. (2015). The association between self-assessed future work ability and long term sickness absence, disability pension and unemployment in a general working population: A 7-year follow-up study. *Journal of Occupational Rehabilitation, 1-9*.
- Lundin, A., Leijon, O., Vaez, M., Hallgren, M., & Torgén, M. (2017). Predictive validity of the Work Ability Index and its individual items in the general population. *Scandinavian Journal of Public Health, 1-7*.
- Lundmark, R., Hasson, H., von Thiele Schwarz, U., Hasson, D., & Tafvelin, S. (2017). Leading for change: Line managers' influence on the outcomes of an occupational health intervention. *Work & Stress, 1-21*.
- Lunt, J. (2013). Towards a standardised approach for behavior change in 21st century occupational health. *Occupational Medicine & Health Affairs, 1*(119), 2. doi: 10.4172/2329-6879.1000119.
- Luszczynska, A., & Schwarzer, R. (2005). Multidimensional health locus of control: Comments on the construct and its measurement. *Journal of Health Psychology, 10*(5), 633-642.
- Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior, 23*(6), 695-706.
- Lyons, P, R. (2015). Core self-evaluation can help in making better recruitment and selection choices. *Human Resource Management International Digest, 23*(3), 17 – 19.

- Mache, S., Danzer, G., Klapp, B. F., & Groneberg, D. A. (2015). Surgeons' work ability and performance in surgical care: Relations between organisational predictors, work engagement and work ability. *Langenbeck's Archives of Surgery*, 398, 317-325.
- Main, C., Glozier, N., & Wright, I. (2005). Validity of the HSE stress tool: An investigation within four organizations by the Corporate Health and Performance Group. *Occupational Medicine*. 55, 208-215.
- Mäkikangas, A., Feldt, T., Kinnunen, U., & Mauno, S. (2013). Does personality matter? A review of individual differences in occupational wellbeing. *Advances in Positive Organizational Psychology*, 1, 107-143.
- Malouff, J. M., Thorsteinsson, E. B., & Schutte, N. S. (2005). The relationship between the five-factor model of personality and symptoms of clinical disorders: A meta-analysis. *Journal of Psychopathology and Behavioral Assessment*, 27(2), 101-114.
- Marmot, M., Feeney, A., Shipley, M., North, F., & Syme, S. L. (1995). Sickness absence as a measure of health status and functioning: From the UK Whitehall II study. *Journal of Epidemiology and Community Health*, 49(2), 124-130.
- Martinez, M. C., Latorre, M. D. R. D. D., & Fischer, F. M. (2009). Validity and reliability of the Brazilian version of the Work Ability Index questionnaire. *Revista de Saúde Pública*, 43(3), 525-532.
- Marqueze, E. C., Voltz, G. P., Borges, F. N., & Moreno, C. R. (2008). A 2-year follow-up study of work ability among college educators. *Applied Ergonomics*, 39(5), 640-645.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52(1), 397-422.
- Matthews, G., Deary, I. J., & Whiteman, M. C. (2009). *Personality Traits*. 3rd Ed. Cambridge University Press.

- Mattke, S., Balakrishnan, A., Bergamo, G., & Newberry, S. J. (2007). A review of methods to measure health-related productivity loss. *American Journal of Managed Care, 13*(4), 211-217.
- Maxwell, S. E. (2004). The persistence of underpowered studies in psychological research: Causes, consequences, and remedies. *Psychological Methods, 9*(2), 147.
- Mayer, J. D. (2007). Asserting the definition of personality. *The online newsletter for personality science, 1*.
- McCrae, R. R. (2002). The maturation of personality psychology: Adult personality development and psychological wellbeing. *Journal of Research in Personality, 36*(4), 307-317.
- McCrae, R. R., & Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*(1), 81-90.
- McCrae, R. R., & Costa, P. T. (1988). Age, personality, and the spontaneous self-concept. *Journal of Gerontology, 43*(6), 177-185.
- McCrae, R. R., & Costa Jr, P. T. (1991). Adding Liebe und Arbeit: The full five-factor model and wellbeing. *Personality and Social Psychology Bulletin, 17*(2), 227-232.
- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*(2), 175-215.
- McDermott, H. J., Kazi, A., Munir, F., & Haslam, C. (2010). Developing occupational health services for active age management. *Occupational Medicine, 60*(3), 193-204.
- McGonagle, A. K., Fisher, G. G., Barnes-Farrell, J. L., & Grosch, J. W. (2015). Individual and work factors related to perceived work ability and labor force outcomes. *Journal of Applied Psychology, 100*(2), 376-398.

- McHugh, M. L. (2013). The Chi-square test of independence. *Biochemia Medica*, 23(2), 143-149.
- Meyer, K., Niedermann, K., Tschopp, A., & Klipstein, A. (2013). Is the work ability index useful to evaluate absence days in ankylosing spondylitis patients? A cross-sectional study. *BMJ open*, 3(3), doi: 10.1136/bmjopen-2012-002231.
- Moreland, R. L., & Sweeney, P. D. (1984). Self-expectancies and reactions to evaluations of personal performance. *Journal of Personality*, 52(2), 156-176.
- Morgan, G. A., Leech, N. L., Gloeckner, G. W., & Barrett, K. C. (2013). *IBM SPSS for introductory statistics: Use and interpretation*. Routledge.
- Morgeson, F. P., Campion, M. A., Dipboye, R. L., Hollenbeck, J. R., Murphy, K., & Schmitt, N. (2007). Reconsidering the use of personality tests in personnel selection contexts. *Personnel Psychology*, 60(3), 683-729.
- Moshe, S., Cinamon, T., Zack, O., Segal, N., Chodick, G., Krakov, A., & Tal, M. (2017). The need for social work services in occupational medicine. *Occupational Medicine*. 67(3), 194-198.
- Nachiappan, N., & Harrison, J. (2005) Work ability among health care workers in the United Kingdom: A pilot. Assessment and promotion of work ability, health and wellbeing of ageing workers. *International Congress Series* 1280, 286-291.
- Nagy, M. S. (2002). Using a single-item approach to measure facet job satisfaction. *Journal of Occupational and Organizational Psychology*, 75, 77-86.
- Naseer, S., Khan, M.B., & Khawaja, K, F. (2012). The impact of Big Five personality traits on psychological detachment from work during off job time. *Journal of Basic and Applied Scientific Research*, 2(12), 12681-12688.

- Neupane, S., Miranda, H., Virtanen, P., Siukola, A., & Nygård, C. H. (2011). Multisite pain and work ability among an industrial population. *Occupational Medicine*, *61*(8), 563-569.
- Niedhammer, I., & Chea, M. (2003). Psychosocial factors at work and self-reported health: Comparative results of cross-sectional and prospective analyses of the French GAZEL cohort. *Occupational and Environmental Medicine*, *60*(7), 509-515.
- Nielsen, K., Nielsen, M. B., Ogbonnaya, C., Käsälä, M., Saari, E., & Isaksson, K. (2017). Workplace resources to improve both employee wellbeing and performance: A systematic review and meta-analysis. *Work & Stress*, 1-20.
- Noone, J. H., Mackey, M.G., & Bohle, P. (2014). *Work ability in Australia – pilot study: A report to Safe Work Australia*. Canberra: Safe Work Australia.
- Notenbomer, A., Groothoff, J. W., van Rhenen, W., & Roelen, C. A. M. (2015). Associations of work ability with frequent and long term sickness absence. *Occupational Medicine*, *65*(5), 373-379.
- Nübling, M., Hasselhorn, H. M., Seitsamo, J., & Ilmarinen, J. (2004, October). Comparing the use of the short and the long disease list in the Work Ability Index Questionnaire. *In Proceedings of the 2nd Symposium on Work Ability*. Verona: ICOH, 74.
- Nurminen, E., Malmivaara, A., Ilmarinen, J., Ylöstalo, P., Mutanen, P., Ahonen, G., & Aro, T. (2002). Effectiveness of a worksite exercise program with respect to perceived work ability and sick leaves among women with physical work. *Scandinavian Journal of Work, Environment & Health*, *28*(2), 85-93.
- Nursing and Midwifery Council (NMC). (2015). The code – professional standards of practice and behaviour for nurses and midwives. Retrieved from: www.nmc.org.uk/globalassets/.../nmc.../revised-new-nmc-code.pdf.

- Office for National Statistics (ONS). (2014). *Annual Mid-Year Population Estimates: 2014*. Retrieved from: <https://www.gov.uk/peoplepopulationandcommunityandmigration/pc>
- Office for National Statistics (ONS). (2013). *Pension Trends – Chapter 4: The Labour Market and Retirement, 2013 Edition*. Retrieved from https://www.gov/ons/dcp171766_297899.pdf
- Ojala, B., Nygård, C. H., Huhtala, H., & Nikkari, S. T. (2017). Does perceived work ability improve after a cognitive behavioral intervention program? *Occupational Medicine*.
- Packer, E. (1984). *The psychological requirements of a free society*. TOF Publications. Retrieved from: www.edithpacker.com/E_Packer/1-931089-17-5.pdf
- Packham, C., Webster, S., & Branch, S. (2009). *Psychosocial working conditions in Britain in 2009*. Health and Safety Executive.
- Palermo, J., Fuller-Tyszkiewicz, M., Walker, A., & Appannah, A. (2013). Primary-and secondary-level organizational predictors of work ability. *Journal of Occupational Health Psychology, 18*(2), 220.
- Palermo, J., Webber, L., Smith, K., & Khor, A. (2012). Factors that predict work ability: Incorporating a measure of organisational values towards ageing. In *Promotion of Work Ability Towards Productive Aging – Selected papers of the 3rd International Symposium on Work Ability*. pp. 45-48.
- Penney, L. M., David, E., & Witt, L. A. (2011). A review of personality and performance: Identifying boundaries, contingencies, and future research directions. *Human Resource Management Review, 21*(4), 297-310.
- Perdue, S. V., Reardon, R. C., & Peterson, G. W. (2007). Person—environment congruence, self-efficacy, and environmental identity in relation to job satisfaction: A career decision theory perspective. *Journal of Employment Counselling, 44*, 29-39.

- Piccolo, R., Judge, T., Takahashi, K., Watanabe, N., & Locke, E. (2005). Core self-evaluations in Japan: Relative effects on job satisfaction, life satisfaction, and happiness. *Journal of Organizational Behaviour*, 26, 965-985.
- Pinder, C. C. (2008). *Work motivation in organizational behavior*. 2nd Ed. Psychology Press.
- Plat, M. C. J., Frings-Dresen, M. H., & Sluiter, J. K. (2012). Impact of chronic diseases on work ability in ageing firefighters. *Journal of Occupational Health*, 54(2), 158-163.
- Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: A meta-analysis. *Journal of Applied Psychology*, 92(2), 438.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Pohjonen, T. (2001). Perceived work ability of home care workers in relation to individual and work-related factors in different age groups. *Occupational Medicine*, 51(3), 209-217.
- Pohjonen, T., & Ranta, R. (2001). Effects of worksite physical exercise intervention on physical fitness, perceived health status, and work ability among home care workers: five-year follow-up. *Preventive Medicine*, 32(6), 465-475.
- Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International Journal of Nursing Studies*, 47(11), 1451-1458.
- Pranjić, N., Maleš-Bilić, L., Beganlić, A., & Mustajbegović, J. (2006). Mobbing, stress, and work ability index among physicians in Bosnia and Herzegovina: Survey study. *Croatian Medical Journal*, 47(5), 750-758.

- Prümper, J., Thewes, K., & Becker, M. (2011). The effect of job control and quantitative workload on the different dimensions of the work ability index. *Age management during the life course*, 102-106.
- Public Health England. (2013). *Nursing and Midwifery Contribution to Public Health: Improving health and wellbeing*. Retrieved from <https://www.gov.uk/government/publications/nursing-and-midwifery-contribution-to-public-health>.
- Public Health England (2014). *From evidence into action: Opportunities to protect and improve the nation's health*. Retrieved from <https://www.gov.uk/government/publications/from-evidence-into-action-opportunities-to-protect-and-improve-the-nations-health>.
- Quilty, L. C., De Fruyt, F., Rolland, J. P., Kennedy, S. H., Rouillon, P. F., & Bagby, R. M. (2008). Dimensional personality traits and treatment outcome in patients with major depressive disorder. *Journal of Affective Disorders*, 108(3), 241-250.
- Uronen, L., Heimonen, J., Puukka, P., Martimo, K. P., Hartiala, J., & Salanterä, S. (2017). Health check documentation of psychosocial factors using the WAI. *Occupational Medicine*, 67(2), 151-154.
- Radkiewicz, P., Widerszal-Bazyl, M., & NEXT-Study Group. (2005, June). Psychometric properties of Work Ability Index in the light of comparative survey study. In *International Congress Series Vol. 1280*, 304-309. Elsevier.
- Rammstedt, B., & Beierlein, C. (2014). Can't we make it any shorter? *Journal of Individual Differences*. 35(4), 212-220.
- Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10 item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, 41(1), 203-212.

- Rammstedt, B., Goldberg, L. R., & Borg, I. (2010). The measurement equivalence of Big-Five factor markers for persons with different levels of education. *Journal of Research in Personality, 44*(1), 53-61.
- Rammstedt, B., Kemper, C. J., Klein, M. C., Beierlein, C., & Kovaleva, A. (2013). A short scale for assessing the Big Five dimensions of personality-10 item Big Five inventory (BFI-10). *Methoden, Daten, Analysen, 7*, 233-249.
- Rautio, M., & Michelsen, T. (2014). *WAI: How to Use the Work Ability Index Questionnaire*. Finnish Institute of Occupational Health.
- Raynal, A. (2015). Occupational medicine is in demise. *BMJ, 351*: h5905.
- Rayton, B., Dodge, T., & D'Analeze, G. (2012). The Evidence: Employee Engagement Task Force "Nailing the evidence" workgroup.
- Razavi, T. (2001). Self-report measures: *An overview of concerns and limitations of questionnaire use in occupational stress research*. School of Management, University of Southampton.
- Reber, A. S., & Reber, E. S. (2001). *The Penguin Dictionary of Psychology*. (3rd ed). London, Penguin Group.
- Rector, N. A., & Roger, D. (1997). The stress buffering effects of self-esteem. *Personality and Individual Differences, 23*(5), 799-808.
- Reilly, T., Rees, A., & Tipton, M. (2009). An assessment of the work ability index (WAI) and its usefulness in predicting and promoting continued work in staff employed by a major UK charity. In M. Kumashiro (Ed.), *Promotion of Work Ability Towards Productive Aging* (pp 83). Selected papers of the 3rd International Symposium on Work Ability. CRC Press.
- Rhodes, C., (2014) *Manufacturing: Statistics and policy*. (Standard note. SN/EP/1942). House of Commons Library.

- Roberts, L. M. (2006). Shifting the lens on organizational life: The added value of positive scholarship. *Academy of Management Review*, *31*(2), 292-305.
- Rode, J. C., Judge, T. A., & Sun, J. M. (2012). Incremental validity of core self-evaluations in the presence of other self-concept traits: An investigation of applied psychology criteria in the United States and China. *Journal of Leadership & Organizational Studies*, *19*(3), 326-340.
- Roelen, C. A. M., Koopmans, P. C., Schreuder, J. A. H., Anema, J. R., & van der Beek, A. J. (2011). The history of registered sickness absence predicts future sickness absence. *Occupational Medicine*, *61*, 96-101.
- Roelen, C. A., van Rhenen, W., Groothoff, J. W., van der Klink, J. J., Twisk, J. W., & Heymans, M. W. (2014). Work ability as prognostic risk marker of disability pension: single item work ability score versus multi-item work ability index. *Scandinavian Journal of Work, Environment & Health*, *40*(4), 428-31.
- Rotter, J. B. (1966). Generalised expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, *80*(1), 1.
- Royal College of Nursing (2013). *A survey report of RCN members on health, wellbeing and stress*. Retrieved from www.rcn.org.uk/_data/assets/pdf_file/0005/541778/004448.pdf.
- Sackett, P. R., & Walmsley, P. T. (2014). Which personality attributes are most important in the workplace? *Perspectives on Psychological Science*, *9*(5), 538-551.
- Salanova, M., Peiró, J. M., & Schaufeli, W. B. (2002). Self-efficacy specificity and burnout among information technology workers: An extension of the job demand-control model. *European Journal of Work and Organizational Psychology*, *11*, 1-25.

- Salanova, M., Del Líbano, M., Llorens, S., & Schaufeli, W. B. (2014). Engaged, workaholic, burned-out or just 9-to-5? Toward a typology of employee well-being. *Stress and Health, 30*(1), 71-81.
- Saltychev, M., Laimi, K., Oksanen, T., Pentti, J., Kivimäki, M., & Vahtera, J. (2012). Does perceived work ability improve after a multidisciplinary preventive program in a population with no severe medical problems: The Finnish Public Sector Study. *Scandinavian Journal of Work and Environmental Health, 39*, 57-65.
- Saltychev, M., Laimi, K., Oksanen, T., Pentti, J., Virtanen, M., Kivimäki, M., & Vahtera, J. (2011). Predictive factors of future participation in rehabilitation in the working population: The Finnish public sector study. *Journal of Rehabilitation Medicine, 43*(5), 404-410.
- Schaufeli, W. B., & Bakker, A. B. (2004). *Utrecht Work Engagement Scale. Preliminary Manual*. (Version 1.1) Unpublished manuscript, Utrecht University, the Netherlands. Retrieved from <http://www.schaufeli.com>
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement, 66*, 701-716.
- Schaufeli, W. B., Martinez, I. M., Pinto, A. M., Salanova, M., & Bakker, A. B. (2002). Burnout and engagement in university students a cross-national study. *Journal of Cross-cultural Psychology, 33*(5), 464-481.
- Schmitt, N. (2004). Beyond the Big Five: Increases in understanding and practical utility. *Human Performance, 17*(3), 347-357.
- Schneider, T. R. (2004). The role of neuroticism on psychological and physiological stress responses. *Journal of Experimental Social Psychology, 40*(6), 795-804.

- Schouten, L. S., Bültmann, U., Heymans, M. W., Joling, C. I., Twisk, J. W., & Roelen, C. A. (2015). Shortened version of the work ability index to identify workers at risk of long term sickness absence. *The European Journal of Public Health*, 1-5.
- Schouteten, R., (2017). Predicting absenteeism: Screening for work ability or burnout. *Occupational Medicine*, 67(1), 52-57.
- Schreuder, J. A. H., Roelen, C. A. M., van der Klink, J. J. L., & Groothoff, J. W. (2013). Characteristics of zero-absenteeism in hospital care. *Occupational Medicine*, 63(4), 266-273.
- Schröer, S., Haupt, J., & Pieper, C. (2013). Evidence-based lifestyle interventions in the workplace – an overview. *Occupational Medicine*, 64, 8-12.
- Seibt, R., Spitzer, S., Blank, M., & Scheuch, K. (2009). Predictors of work ability in occupations with psychological stress. *Journal of Public Health*, 17(1), 9- 18.
- Seitsamo, J., & Klockars, M. (1997). Aging and changes in health. *Scandinavian Journal of Work, Environment & Health*, 27-35.
- Seppälä, P., Mauno, S., Feldt, T., Hakanen, J., Kinnunen, U., Tolvanen, A., & Schaufeli, W. (2009). The construct validity of the Utrecht Work Engagement Scale: Multisample and longitudinal evidence. *Journal of Happiness Studies*, 10, 459-481.
- Seymour, L., & Grove, B. (2005). *Workplace interventions for people with common mental health disabilities: A review of the scientific evidence on the management of common mental health disabilities at work*. Retrieved from BOHRF at:
<http://www.bohrf.org.uk/projects/mhealth.html>.
- Shain, M., & Kramer, D. M. (2004). Health promotion in the workplace: Framing the concept; reviewing the evidence. *Occupational and Environmental Medicine*, 61(7), 643-648.

- Sheldon, K. M., & King, L. (2001). Why positive psychology is necessary. *American Psychologist*, *56*(3), 216-217.
- Sheridan, J. E. (1992). Organizational culture and employee retention. *Academy of Management Journal*, *35*(5), 1036-1056.
- Sheykhshabani, S. H. (2011). Validity and reliability of core self-evaluations scale in Iranian employees. *Procedia-Social and Behavioural Sciences*, *15*, 1561-1565.
- Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, *1*, 27-41.
- Silva, A. A., Marqueze, E. C., Rotenberg, L., Fischer, F. M., & de Castro Moreno, C. R. (2012). Shift workers in electrical systems control rooms: job satisfaction and work ability. *Sleep Science*. *5*(2), 49-55.
- Sjögren-Rönkä, T., Ojanen, M. T., Leskinen, E. K., Mustalampi, S. T., & Mälkiä, E. A. (2002). Physical and psychosocial prerequisites of functioning in relation to work ability and general subjective wellbeing among office workers. *Scandinavian Journal of Work, Environment & Health*, 184-190.
- Skakon, J., Nielsen, K., Borg, V., & Guzman, J. (2010). Are leaders' wellbeing, behaviours and style associated with the affective wellbeing of their employees? A systematic review of three decades of research. *Work & Stress*, *24*(2), 107-139.
- Smit, F., Cuipers, P., Petrea, I., & McDaid, D. (2015). Protecting mental health, preventing depression: Do we have an economic case? In McDaid, David and Sassi, Franco and Merkur, Sherry, (eds.) *Promoting Health, Preventing Disease: The Economic Case*. Open University Press, Maidenhead, Berkshire, England, 215-233.

- Smith, A., Brice, C., Collins, A., Matthews, V., & McNamara, R. (2000). *The Scale of Occupational Stress: A further analysis of the impact of demographic factors and type of job*. Health and Safety Executive Contract Research Report 311/2000. Cardiff, UK: Cardiff University.
- Sosik, J. J., & Godshalk, V. M. (2000). Leadership styles, mentoring functions received, and job-related stress: A conceptual model and preliminary study. *Journal of Organizational Behavior, 21*(4), 365-390.
- Spanier, K., Radoschewski, F. M., Gutenbrunner, C., & Bethge, M. (2014). Direct and indirect effects of organizational justice on work ability. *Occupational Medicine, 64*(8), 638-643.
- Spector, P. E. (2006). Method variance in organizational research. *Organizational Research Methods, 9*, 221–232.
- Spector, P. E., & Pindek, S. (2015). The future of research methods in work and occupational health psychology. *Applied Psychology, 1-20*.
- Spector, P. E. (2017). The Lost Art of Discovery: The Case for Inductive Methods in Occupational Health Science and the Broader Organizational Sciences. *Occupational Health Science, 1-17*.
- Sudha, K. S., & Khan, W. (2013). Personality and motivational traits as correlates of workplace deviance among public and private sector employees. *Journal of Psychology, 4*(1), 25-32.
- Suff, R. (2016). *Growing the health and wellbeing agenda: From first steps to full potential*. Retrieved from CIPD: <https://www.cipd.co.uk/publicpolicy/policy-reports/health-wellbeing-agenda.aspx>

- Sundstrup, E., Jakobsen, M. D., Mortensen, O. S., & Andersen, L. L. (2017). Joint association of multimorbidity and work ability with risk of long term sickness absence: A prospective cohort study with register follow-up. *Scandinavian Journal of Work, Environment & Health*, 43(2), 146-154.
- Ståhl, C., Svensson, T., Petersson, G., & Ekberg, K. (2009). The work ability divide: Holistic and reductionistic approaches in Swedish interdisciplinary rehabilitation teams. *Journal of Occupational Rehabilitation*, 19(3), 264-273.
- Stansfeld, S., Woodley-Jones, D., Rasul, F., Head, J., Clarke, S., & Mackay, C. (2008). Work-related distress in the 1990s-a real increase in ill health? *Journal of Public Mental Health*, 7(1), 26-31.
- Steel, P., Schmidt, J., & Shultz, J. (2008). Refining the relationship between personality and subjective wellbeing. *Psychological Bulletin*, 134(1), 138.
- Stetz, M. C., Thomas, M. L., Russo, M. B., Stetz, T. A., Wildzunas, R. M., McDonald, J. J., & Romano, J. A. (2007). Stress, mental health, and cognition: A brief review of relationships and countermeasures. *Aviation, Space, and Environmental Medicine*, 78 (Supplement 1), B252-B260.
- Stewart, G. L., Courtright, S. H., & Barrick, M. R. (2012). Peer-based control in self-managing teams: Linking rational and normative influence with individual and group performance. *Journal of Applied Psychology*, 97(2), 435-447.
- Stigmar, K., Ekdahl, C., & Grahn, B. (2012). Work ability: Concept and assessment from a physiotherapeutic perspective. An interview study. *Physiotherapy Theory and Practice*, 28(5), 344-354.
- Stumpff, T., Muck, P., Hulsheger, U., Judge, T., & Maier, G. (2010). Core self-evaluations in Germany: Validation of a German measure and its relationships with career success. *Applied Psychology: An International Review*, 59, 674-700.

- Sturesson, M., Edlund, C., Fjellman-Wiklund, A., Falkdal, A. H., & Bernspång, B. (2013). Work ability as obscure, complex and unique: Views of Swedish occupational therapists and physicians. *Work (Reading, Mass.)*, 45(1), 117-128.
- Swann, C., Carmona, C., Ryan, M., Raynor, M., Baris, E., Dunsdon, S., ... & Kelly, M. P. (2009). *Health systems and health-related behaviour change: A review of primary and secondary evidence*. National Institute for Health and Clinical Excellence.
- Taimela, S., Malmivaara, A., Justen, S., Läärä, E., Sintonen, H., Tiekso, J., & Aro, T. (2008). The effectiveness of two occupational health intervention programmes in reducing sickness absence among employees at risk. Two randomised controlled trials. *Occupational and Environmental Medicine*, 65(4), 236-241.
- Taskila, T., Shreeve, V., Laghini, M., Bevan, S. (2015). *Living Long, Working Well: Supporting older workers with health conditions to remain active at work*. The Work Foundation. Retrieved from: <https://theworkfoundation.com/Reports/386/Living-long-working-well>.
- Taskinen, H. (2004). *Good occupational health practice: A guide for planning and follow-up of occupational health services*. Finnish Institute of Occupational Health.
- Taris, T. W., & Kompier, M. A. (2003). Challenges in longitudinal designs in occupational health psychology. *Scandinavian Journal of Work, Environment & Health*, 1-4.
- Taris, T. W., & Kompier, M. A. (2014). Cause and effect: Optimizing the designs of longitudinal studies in occupational health psychology. *Work & Stress*, 28(1), 1-8.
- Taris, T.W., de Lange, A.H., & Kompier, M.A. (2010). Research Methods in Occupational Health Psychology. In S. Leka & J. Houdmont (Eds.), *Occupational Health Psychology*. (pp. 269-297) Oxford: Wiley-Blackwell.
- Taskinen, H. (2004). *Good occupational health practice: A guide for planning and follow-up of occupational health services*. Finnish Institute of Occupational Health.

- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.
- Taylor, P. J. (1968). Personal factors associated with sickness absence: A study of 194 men with contrasting sickness absence experience in a refinery population. *British Journal of Industrial Medicine*, 25(2), 106-118.
- Tengland, P. A. (2011). The concept of work ability. *Journal of Occupational Rehabilitation*, 21(2), 275-285.
- Tennant, C. (2001). Work-related stress and depressive disorders. *Journal of Psychosomatic Research*, 51(5), 697-704.
- Tetrick, L. E., & Quick, J. C. (2003). Prevention at work: Public health in occupational settings. In Quick, J. C., & Tetrick, L. E. (Ed), (2003). *Handbook of Occupational Health Psychology*. (pp. 3-17). Washington, DC, US, American Psychological Association.
- Therasa, C., & Vijayabanu, C. (2015). The impact of Big Five personality traits and positive psychological strengths towards job satisfaction: a review. *Periodica Polytechnica. Social and Management Sciences*, 23(2), 142.
- Tillett, R. (2003). The patient within—psychopathology in the helping professions. *Advances in Psychiatric Treatment*, 9(4), 272-279.
- Tims, M., Bakker, A. B., Derks, D., & van Rhenen, W. (2013). Job crafting at the team and individual level: Implications for work engagement and performance. *Group & Organization Management*, 38(4), 427-454.
- Trade Union Congress. (2014). *Tackling workplace stress using the HSE stress management standards – Guidance for Health & Safety Representatives*. Retrieved from: <https://www.tuc.org.uk/workplace-issues/health-and-safety/guides-and-reports-reps/stress/safety-reps-guide-hse-stress>.

- Transport for London. (2011). *Smarter Working Guide*. Retrieved from:
<https://tfl.gov.uk/info-for/business-and-commercial/travel-for-business/flexible-working>.
- Tuomi, K., Ilmarinen, J., Jahkola, A., Katajarinne, L., Tulkki, A. (1998). *Work Ability Index*. 2nd revised ed. Helsinki. Finnish Institute of Occupational Health.
- Tuomi, K., Ilmarinen, J., Seitsamo, J., Huuhtanen, P., Martikainen, R., Nygård, C. H., & Klockars, M. (1997). Summary of the Finnish research project (1981-1992) to promote the health and work ability of aging workers. *Scandinavian Journal of Work, Environment & Health*, 66-71.
- Turner-Stokes, L., Fadyl, J., Rose, H., Williams, H., Schlüter, P., & McPherson, K. (2014). The Work-ability Support Scale: Evaluation of scoring accuracy and rater reliability. *Journal of Occupational Rehabilitation*, 24(3), 511-524.
- Tsaousis, I., Nikolaou, I., Serdaris, N., & Judge, T. (2007). Do the core self-evaluations moderate the relationship between subjective wellbeing and physical and psychological health? *Personality and Individual Differences*, 42, 1441-1452.
- Tyssen, R., Dolatowski, F. C., Røvik, J. O., Thorkildsen, R. F., Ekeberg, Ø., Hem, E., ... & Vaglum, P. (2007). Personality traits and types predict medical school stress: A six-year longitudinal and nationwide study. *Medical Education*, 41(8), 781-787.
- Vahtera, J., Kivimäki, M., Pentti, J., & Theorell, T. (2000). Effect of change in the psychosocial work environment on sickness absence: A seven year follow up of initially healthy employees. *Journal of Epidemiology and Community Health*, 54(7), 484-493.

- Vallejo, M. A., Jordán, C. M., Díaz, M. I., Comeche, M. I., & Ortega, J. (2007). Psychological assessment via the internet: A reliability and validity study of online (vs paper-and-pencil) versions of the General Health Questionnaire-28 (GHQ-28) and the Symptoms Check-List-90-Revised (SCL-90-R). *Journal of Medical Internet Research, 9(1)*, e2.
- Vänni, K., Virtanen, P., Luukkaala, T., & Nygård, C. H. (2012). Relationship between perceived work ability and productivity loss. *International Journal of Occupational Safety and Ergonomics, 18(3)*, 299-309.
- van den Berg, T., Elders, L., de Zwart, B., & Burdorf, A. (2008). The effects of work-related and individual factors on the Work Ability Index: A systematic review. *Occupational and Environmental Medicine, 66*, 211-220.
- van den Heuvel, S. G., & van der Beek, A. J. (2014). The influence of chronic health problems on work ability and productivity at work: A longitudinal study among older employees. *Scandinavian Journal of Work, Environment & Health, 40(5)*, 473.
- van Hooff, M. L., Geurts, S. A., Kompier, M. A., & Taris, T. W. (2007). Workdays, in-between workdays and the weekend: A diary study on effort and recovery. *International Archives of Occupational and Environmental Health, 80(7)*, 599-613.
- van de Vijfeijke, H., Leijten, F. R., Ybema, J. F., van den Heuvel, S. G., Robroek, S. J., van der Beek, A. J., ... & Taris, T. W. (2013). Differential effects of mental and physical health and coping style on work ability: A 1-year follow-up study among aging workers. *Journal of Occupational and Environmental Medicine, 55(10)*, 1238-1243.
- Verbeek, J. (2013). Should construction workers work harder to improve their health? *Scandinavian Journal of Work, Environment & Health, 39*, 427-429.

- Vercruyssen, A., Roose, H., Carton, A., & Putte, B. V. D. (2014). The effect of busyness on survey participation: Being too busy or feeling too busy to cooperate? *International Journal of Social Research Methodology*, *17*(4), 357-371.
- Viotti, S., Guidetti, G., Loera, B., Martini, M., Sottimano, I., & Converso, D. (2017). Stress, work ability, and an aging workforce: A study among women aged 50 and over. *International Journal of Stress Management*, *24*(S1), 98-121.
- von Bonsdorff, M. B., Seitsamo, J., Ilmarinen, J., Nygård, C. H., von Bonsdorff, M. E., & Rantanen, T. (2011). Work ability in midlife as a predictor of mortality and disability in later life: A 28-year prospective follow-up study. *Canadian Medical Association Journal*, *183*(4), E235-E242.
- Vuokko, A., Selinheimo, S., Sainio, M., Suojalehto, H., Järnefelt, H., Virtanen, M., ... & Karvala, K. (2015). Decreased work ability associated to indoor air problems—an intervention (RCT) to promote health behavior. *Neurotoxicology* *49*, 59-67.
- Waddell, G., Burton, A. K., & Kendall, N. A. (2008). *Vocational rehabilitation—what works, for whom, and when?* (Report for the Vocational Rehabilitation Task Group). TSO.
- Wang, J., & Patten, S. B. (2001). Perceived work stress and major depression in the Canadian employed population, 20-49 years old. *Journal of Occupational Health Psychology*, *6*(4), 283-289.
- Wanous, J. P., Reichers, A. E., & Hudy, M. J. (1997). Overall job satisfaction: How good are single item measures? *Journal of Applied Psychology*, *82*, 247-252.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin*, *96*(3), 465-490.
- Weigold, A., Weigold, I. K., & Russell, E. J. (2013). Examination of the equivalence of self-report survey-based paper-and-pencil and internet data collection methods. *Psychological Methods*, *18*(1), 53.

- Whitehead, B. R., & Bergeman, C. S. (2013). Self-reported health bias: The role of daily affective valence and arousal. *Psychology & Health, 28*(7), 784-799.
- Winding, T. N., Labriola, M., Nohr, E. A., & Andersen, J. H. (2015). The experience of demanding work environments in younger workers. *Occupational Medicine, 65*(4), 324-330.
- Woods, Lievens, De Fruyt & Wille (2013) Personality across working life: The longitudinal and reciprocal influences of personality on work. *Journal of Organisational Behaviour, 34*, 7-25.
- World Health Organization. (2002). *Good practice in occupational health services: A contribution to workplace health*. Regional Office for Europe. Retrieved from <http://www.euro.who.int>
- Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior, 74*(3), 235-244.
- Yaakub, K., Shaari, R., Panatik, S. A., & Rahman, A. (2013). Towards an understanding of the effect of core self-evaluations and knowledge sharing behaviour. *International Journal of Applied Psychology, 3*(1), 13-18.
- Youssef, C. M., & Luthans, F. (2007). Positive organizational behaviour in the workplace the impact of hope, optimism, and resilience. *Journal of Management, 33*(5), 774-800.
- Zapf, D., Dormann, C., & Frese, M. (1996). Longitudinal studies in organizational stress research: A review of the literature with reference to methodological issues. *Journal of Occupational Health Psychology, 1*(2), 145.

- Zenger, M., Körner, A., Maier, G. W., Hinz, A., Stöbel-Richter, Y., Brähler, E., & Hilbert, A. (2015). The Core Self-Evaluation Scale: Psychometric properties of the German version in a representative sample. *Journal of Personality Assessment, 97*(3), 310-318.
- Zhang, R. P., & Tsingan, L. (2014). Extraversion and neuroticism mediate associations between openness, conscientiousness, and agreeableness and affective wellbeing. *Journal of Happiness Studies, 15*(6), 1377-1388.
- Zillig, L. M. P., Hemenover, S. H., & Dienstbier, R. A. (2002). What do we assess when we assess a Big Five trait? A content analysis of the affective, behavioral, and cognitive processes represented in Big Five personality inventories. *Personality and Social Psychology Bulletin, 28*(6), 847-858.
- Zulkefly, S. N., & Baharudin, R. (2010). Using the 12 item General Health Questionnaire (GHQ-12) to assess the psychological health of Malaysian college students. *Global Journal of Health Science, 2*, p73-80.

Appendices

Appendix A

Understanding and use of the Work Ability Index.

This survey is designed to establish the understanding of Work Ability and the use of the Work Ability Index among Occupational Health Professionals. It should take no longer than 10 minutes to complete. I thank you in advance for your participation.

1. What do you understand by the term work ability?

2. Have you heard of the Work Ability Index?

- Yes
 No

3. If you are aware of the Work Ability Index, how did you hear about it? (please tick all that apply)

- Reading journals
 Attended a training course
 At a presentation
 Through my own occupational health practice
 Through my own research
 It is used in the organisation (s) I work in
 Other (please specify)

4. Have you ever used the Work Ability Index?

- Yes
 No

5. How have you used the Work Ability Index? (please tick all that apply)

- As part of a health surveillance programme
 As a workplace health promotion tool
 In individual occupational health case management
 As a research tool
 As part of an ageing at work programme
 Other (please specify)

6. Did you find the Work Ability Index straightforward to use?

- Yes
 No
 Don't know

7. Why did you find the Work Ability Index straightforward to use?

	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
The questions were clear to the questionnaire administrator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The questions were clearly understood by the employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The questions were perceived as relevant by the employee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is easy to analyse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify)

8. Which version of the Work Ability Index did you use? (please tick all that apply)

- The short version – (14 item disease list)
 The long version – (51 item disease list)
 Single item version (Question – What is your current work ability compared with life time best?)
 Other (please specify)

9. If the Work Ability Index was not straightforward to use was it because

	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
The questions were not clear to the questionnaire administrator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The questions were not clearly understood by the employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The questions were perceived as irrelevant by the questionnaire administrator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The questions were perceived as irrelevant by the employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is not easy to analyse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify)

10. How have the results of the questionnaire been used? (please tick all that apply)

- To understand health trends at an individual level
 To understand health trends at a working population level
 To help rehabilitation back to work
 To understand the work ability of older employees
 To understand the work ability of younger employees
 To understand the work ability of all ages
 To predict sickness absence
 To contribute towards health promotion and wellbeing initiatives in the workplace
 For a research project on work ability
 Other (please specify)

11. Why have you not used the Work Ability Index (please tick all apply)

	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
I have not had any training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is too expensive to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is too time consuming to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The organisation (s) I work with would not support its use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It would not add value to my practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work ability is currently not a priority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify)

12. Who do you think should be able to use the Work Ability Index? (please tick all that apply)

- Occupational health nurses
 Occupational health doctors/physicians
 Managers
 Union representatives
 Researchers (with nursing or medical background)

- Researchers (with no nursing or medical background)
- Human resource practitioners
- Primary care practitioners e.g. Practice nurses
- Health and safety practitioners
- Other
- Don't know

Why have you chosen the above answer?

13. What is your occupation?

- Occupational health nurse
- Occupational health doctors/physician
- Other nurse
- Other doctor
- Occupational health technician
- Academic researcher
- Health and safety practitioner
- Occupational health practitioner (non clinical)
- Other (please specify)

14. What is your age? (please specify in years e.g. 35yrs)

15. What is your gender?

- Female
- Male

16. How many years have you been practicing in your current speciality? (please specify in years)

17. In which country do you mainly work?

- UK
- Finland

Other (please specify)

18. If you work in Finland what are the main factors which influence the use of the Work Ability Index in Finland?

19. The end

Thank you for taking part in this survey. If you are interested in a copy of the results then please enter your e-mail address below. Your e-mail address will remain confidential and will not be passed onto any third party.

Appendix B: Cover letter inviting employees to participate in study 2.



Work and Health Introduction

There is a lack of knowledge about the health of workers in the manufacturing sector in the UK. This questionnaire is part of a research project that seeks to fill that knowledge gap. The overall aim of the research is to develop ways in which to proactively support and help people stay at work as they age. This questionnaire examines the relationship between physical and mental health and individual characteristics. In two years' time you will be sent a repeat questionnaire to see whether anything has changed.

I would be very grateful if you could answer the questions and post the completed questionnaire in the enclosed addressed envelope. Before you complete the questionnaire please read the following;

- The results are entirely anonymous, you will not be asked for your name.
- A summary of the results will be given to your organisation but no individual answers will be disclosed – these remain confidential to me and my research supervisor, at the University of Nottingham.
- The results of the study may form the basis of a future academic journal article.
- All data will be stored in accordance with the Data Protection Act 1998.
- Your contribution is voluntary; you do not have to participate if you do not want to.
- This study has been approved by the Research Ethics Committee of the Institute of Work, Health and Organisations at the University of Nottingham.
- The questionnaire should take you only 10-15 minutes to complete.
- In the unlikely event that you feel distressed completing this questionnaire, please contact your GP for advice.
- A summary of the findings will be available from the researcher on request, please use the contact details below.

Researcher

This research is being conducted by Karen Coomer, an Occupational Health Nurse Practitioner and a PhD student at the University of Nottingham. Contact details: T: 07748 595028. E: lwkc@nottingham.ac.uk

Supervisor

The academic supervisor for this research is Dr Jonathan Houdmont, Lecturer in Occupational Health Psychology, at the University of Nottingham. Contact details: E: jonathan.houdmont@nottingham.ac.uk

Appendix C: Measures of work ability, CSE, psychological distress, job satisfaction, work engagement and sickness absence.

Part 1 – Your health

The ability to carry out your job is dependent on factors such as skill, experience and health. This part of the questionnaire contains questions concerning your work and health.

1. Assume that your work ability at its best has a value of 10 points. How many points would you give your current work ability? (0 means you currently cannot work at all). Please circle your answer.

0	1	2	3	4	5	6	7	8	9	10
Poor			Average				Excellent			

2. Work ability in relation to the demands of the job.

How do you rate your current work ability with respect to the physical demands of your work? Please circle your answer.

1	2	3	4	5
Very poor	Rather poor	Moderate	Rather good	Very good

How do you rate your current work ability with respect to the mental demands of your work? Please circle your answer.

1	2	3	4	5
Very poor	Rather poor	Moderate	Rather good	Very good

3. Current health problems

In the following list, mark your current diseases or injuries. Also indicate whether a doctor has diagnosed or treated these diseases.

	Yes – own opinion	Yes – doctors diagnosis
Injury due to an accident (eg, in back, limbs or burns)	<input type="checkbox"/>	<input type="checkbox"/>
Musculoskeletal disease in back, limbs or other part of the body (eg, repeated pain in joint or muscle, sciatica, rheumatism, arthritis)	<input type="checkbox"/>	<input type="checkbox"/>
Cardiovascular disease (eg, high blood pressure, coronary heart disease, angina)	<input type="checkbox"/>	<input type="checkbox"/>
Respiratory disease (eg, repeated chest infections, asthma, chronic bronchitis/emphysema)	<input type="checkbox"/>	<input type="checkbox"/>
Mental disorder (eg, depression, anxiety, mental health problem)	<input type="checkbox"/>	<input type="checkbox"/>
Neurological or sensory disease (eg, hearing, visual problems, migraine, epilepsy, stroke, neuralgia)	<input type="checkbox"/>	<input type="checkbox"/>
Digestive disease/condition (eg, gall stones, liver or pancreatic problem, gastric or duodenal ulcer, coeliac disease, crohns or ulcerative colitis)	<input type="checkbox"/>	<input type="checkbox"/>
Genitourinary disease (eg, urinary tract infection, kidney disease, gynaecological or prostate disease)	<input type="checkbox"/>	<input type="checkbox"/>
Skin disease (eg, allergic rash, eczema, psoriasis)	<input type="checkbox"/>	<input type="checkbox"/>
Tumour or cancer	<input type="checkbox"/>	<input type="checkbox"/>
Endocrine or metabolic disease (eg, diabetes, severe obesity, thyroid disease, gout)	<input type="checkbox"/>	<input type="checkbox"/>
Blood diseases (eg, anemia, other blood disorder)	<input type="checkbox"/>	<input type="checkbox"/>
Birth defects	<input type="checkbox"/>	<input type="checkbox"/>
Other disorder or disease not listed	<input type="checkbox"/>	<input type="checkbox"/>

4. Estimated work impairment due to diseases				
1) If you have <u>no</u> injury or disease please tick here <input type="checkbox"/>				
2) If your illness or injury is a hindrance to your current job please answer the questions below? Circle more than one alternative if needed.				
I am able to do my job, but it causes symptoms				5
I must sometimes slow down my work pace or change the way I work				4
I must often slow down my work pace or change the way I work				3
Because of my health, I feel only able to work part-time				2
In my opinion I am entirely unable to work				1
5. Illness within the last year (12 months)				
During the last 12 months: how many whole days have you been off work because of a health problem?				
Please circle your answer.				
5	4	3	2	1
None	At the most 9	10-24 days	25-99 days	100 – 354 days

6. Estimation of own work ability in 2 years' time		
Do you believe, on the basis of your present state of health, that you will be able to do your current job two years from now? Please circle your answer.		
1	2	3
Unlikely	Not certain	Relatively certain

7. Mental capacities. Please circle your answers to the questions below.				
Have you recently been able to enjoy your regular daily activities?				
0	1	2	3	4
Never	Rather seldom	Sometimes	Rather often	Often
In the last 3 months have you been active and alert?				
0	1	2	3	4
Never	Rather seldom	Sometimes	Rather often	Often
In the last 3 months have you recently felt yourself to be full of hope for the future?				
0	1	2	3	4
Never	Rather seldom	Sometimes	Rather often	Continuously

8. Below are several statements about you with which you may agree or disagree. Please circle <u>one</u> answer on each line.					
	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
I am confident I get the success I deserve in life	1	2	3	4	5
Sometimes I feel depressed	1	2	3	4	5

When I try, I generally succeed	1	2	3	4	5
Sometimes when I fail I feel worthless	1	2	3	4	5
I complete tasks successfully	1	2	3	4	5
Sometimes, I do not feel in control of my work	1	2	3	4	5
Overall, I am satisfied with myself	1	2	3	4	5
I am filled with doubts about my competence	1	2	3	4	5
I determine what will happen in my life	1	2	3	4	5
I do not feel in control of my success in my career	1	2	3	4	5
I am capable of coping with most of my problems	1	2	3	4	5
There are times when things look pretty bleak and hopeless to me	1	2	3	4	5

9. How well do the following statements describe you? Please circle one answer on each line.

I see myself as someone who....	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
Is reserved	1	2	3	4	5
Is generally trusting	1	2	3	4	5
Tends to be lazy	1	2	3	4	5
Is relaxed, handles stress well	1	2	3	4	5
Has few artistic, creative interests eg, music, craft	1	2	3	4	5
Is outgoing, sociable	1	2	3	4	5
Tends to find fault with others	1	2	3	4	5
Does a thorough job	1	2	3	4	5
Gets nervous easily	1	2	3	4	5
Has an active imagination	1	2	3	4	5
Is considerate and kind to almost everyone	1	2	3	4	5

10. The following questions are related to whether you have any medical complaints, and how your health has been in general, over the past few weeks.

Please answer ALL questions simply by circling the answer which you think most nearly applies to you.

Remember that we want to know about present and recent complaints, not those you had in the past. Please try and answer all the questions.

HAVE YOU RECENTLY...

Been able to concentrate on whatever you're doing?	Better than usual	Same as usual	Less than usual	Much less than usual
Lost much sleep over worry	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less useful than usual	Much less useful
Felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt you couldn't overcome your difficulties	Not at all	No more than usual	Rather more than usual	Much more than usual
Been able to enjoy your normal day-to-day activities?	More so than usual	Same as usual	Less so than usual	Much less than usual
Been able to face up to your problems	More so than usual	Same as usual	Less able than usual	Much less able
Been feeling unhappy and depressed	Not at all	No more than usual	Rather more than usual	Much more than usual
Been losing confidence in yourself	Not at all	No more than usual	Rather more than usual	Much more than usual
Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling reasonably happy, all things considered?	More so than usual	About the same as usual	Less so than usual	Much less than usual

Part 2 – Your work

11. Overall, how satisfied are you with your job? Please circle your answer.

1	2	3	4	5
Not satisfied	Moderately	Neutral	Quite satisfied	Very satisfied

12. The following nine statements are about how you feel at work. Please read each statement carefully and decide if you ever feel this way about your job. Please circle one answer on each line.

	Never	Almost never (A few times a year or less)	Rarely (Once a month or less)	Sometimes (A few times a month)	Often (Once a week)	Very often (A few times a week)	Always (Every day)
At my work I feel bursting with energy	0	1	2	3	4	5	6
At my job, I feel strong and vigorous	0	1	2	3	4	5	6
I am enthusiastic about my job	0	1	2	3	4	5	6
My job inspires me	0	1	2	3	4	5	6
When I get up in the morning, I feel like going to work	0	1	2	3	4	5	6
I feel happy when I am working intensely	0	1	2	3	4	5	6
I am proud of the work that I do	0	1	2	3	4	5	6
I am immersed in my work	0	1	2	3	4	5	6
I get carried away when I am working	0	1	2	3	4	5	6

13. The following question is related to stress at work
How stressful do you find your job? Please circle your answer.

1	2	3	4	5
Not at all stressful	Mildly stressful	Moderately stressful	Very stressful	Extremely stressful

14. The following question is related to absence at work
How many spells of absence have you taken off work due to ill health, in the past 12 months? Please circle your answer.

1	2	3	4	5
None	1 spell	2-3 spells	4-5 spells	Above 5 spells

That is the end of the questions related to health and work.

15. The following questions are to understand the differences between the groups of people who have completed the questionnaire. Please answer all questions.

What is your age? Eg, 40 yrs				<input type="text"/>
Are you Female <input type="checkbox"/> Male <input type="checkbox"/>				
What is your current marital status?			Please tick all that apply	
Single / never married			<input type="checkbox"/>	
Married			<input type="checkbox"/>	
Separated			<input type="checkbox"/>	
Divorced			<input type="checkbox"/>	
Widowed			<input type="checkbox"/>	
Living with a partner			<input type="checkbox"/>	
Do you have any dependents living with you?			Please tick all that apply	
Children under 16yrs			<input type="checkbox"/>	
Ageing relatives			<input type="checkbox"/>	
Disabled person/s			<input type="checkbox"/>	
What is your nationality?				
What is your ethnic origin? Eg, White British, Asian				
Which area of the UK do you work?				
Scotland	<input type="checkbox"/>	West Midlands	<input type="checkbox"/>	
Wales	<input type="checkbox"/>	East Midlands	<input type="checkbox"/>	
North East England	<input type="checkbox"/>	Eastern England	<input type="checkbox"/>	
North West England	<input type="checkbox"/>	London	<input type="checkbox"/>	
Yorkshire and Humber	<input type="checkbox"/>	South West England	<input type="checkbox"/>	
Northern Ireland	<input type="checkbox"/>	South East England	<input type="checkbox"/>	
Don't know	<input type="checkbox"/>	Other	<input type="checkbox"/>	
Please indicate your qualifications. Please tick all that apply.				
CSE's	<input type="checkbox"/>	Post Graduate Degree	<input type="checkbox"/>	
O Levels	<input type="checkbox"/>	City & Guilds	<input type="checkbox"/>	
GCSE's	<input type="checkbox"/>	NVQ	<input type="checkbox"/>	
A Levels	<input type="checkbox"/>	No formal qualifications	<input type="checkbox"/>	
Degree	<input type="checkbox"/>	Other – please write below	<input type="checkbox"/>	
		<input type="text"/>		
How long have you worked for your company?				
What is your main job role?				

Production/Machine Operator	<input type="checkbox"/>	Technician	<input type="checkbox"/>
Manager	<input type="checkbox"/>	Warehouse Operator	<input type="checkbox"/>
Supervisor/Team Leader	<input type="checkbox"/>	Engineer	<input type="checkbox"/>
Office worker (admin)	<input type="checkbox"/>	Other – please write below <div style="border: 1px solid black; height: 40px; width: 100%;"></div>	<input type="checkbox"/>
What is your date of birth? (This will be kept strictly confidential and will only be used as an identifier to match the next questionnaire in two years' time).			
Eg, Day/Month/Year			

Date of completion:

E.g., Day/month/year

Thank you for your contribution to this research, it is very much appreciated and I look forward to contacting you again in 2 years' time to complete a final questionnaire.

Karen Coomer

Appendix D: Results of hypothesis testing from study 2 and 3

In this review, two types of statistical associations are distinguished. When a determinant is statistically significant it is described as supported with the hypothesis. When no significant association is found between the determinant and WAI it is described as not supported.

Hypothesis		Degree of support	
Psychological distress		Study 2	Study 3
Study 2	WA is associated with psychological distress after accounting for participant age and gender.	Full support	
Study 2	CSE is associated with psychological distress after accounting for participant age and gender.	Full support	
Study 2	Big Five traits are associated with psychological distress after accounting for participant age and gender.	Full support (neuroticism)	
Study 3	WA, CSE and Big Five experienced at Time 1 predict psychological distress at Time 2 after accounting for participant age, gender and psychological distress at Time 1.		Not supported
Study 3	The relationship between WA and psychological distress remain stable at T2.		Full support
Job stress		Study 2	Study 3
Study 2	WA is associated with job stress after accounting for participant age and gender.	Full support	
Study 2	CSE is associated with job stress after accounting for participant age and gender.	Full support	
Study 2	Big Five traits are associated with job stress after accounting for participant age and gender.	Full support (neuroticism)	
Study 3	WA and CSE and Big Five experienced at Time 1 predict job stress at Time 2 after accounting for participant age, gender and job stress at Time 1.		Not supported
Study 3	The relationship between WA and job stress remain stable at T2.		Full support

Hypothesis		Degree of support	
Job satisfaction		Study 2	Study 3
Study 2	WA is associated with job satisfaction after accounting for participant age and gender.	Full support	
Study 2	CSE is associated with job satisfaction after accounting for participant age and gender.	Full support	
Study 2	Big Five traits are associated with job satisfaction after accounting for participant age and gender.	Not supported	
Study 3	WA and CSE and Big Five experienced at Time 1 predict job satisfaction at Time 2 after accounting for participant age, gender and job satisfaction at Time 1.		Not supported
Study 3	The relationship between WA and job satisfaction remain stable at T2.		Full support
Work engagement		Study 2	Study 3
Study 2	WA is associated with work engagement after accounting for participant age and gender.	Full support	
Study 2	CSE is associated with work engagement after accounting for participant age and gender.	Full support	
Study 2	Big Five traits are associated with work engagement after accounting for participant age and gender.	Full support (neuroticism, conscientiousness, agreeableness)	
Study 3	WA and CSE and Big Five experienced at Time 1 predict work engagement at Time 2 after accounting for participant age, gender and work engagement at Time 1.		Not supported
Study 3	The relationship between WA and work engagement remain stable at T2.		Full support

Hypothesis		Degree of support	
Sickness absence		Study 2	Study 3
Study 2	WA is associated with sickness absence after accounting for participant age and gender.	Full support	
Study 2	CSE is associated with sickness absence after accounting for participant age and gender.	Not supported	
Study 2	Big Five traits are associated with sickness absence after accounting for participant age and gender.	Not supported	
Study 3	WA, CSE and Big Five experienced at Time 1 predict sickness absence at Time 2 after accounting for participant age, gender and psychological distress at Time 1.		Not supported
Study 3	The relationship between WA and sickness absence remain stable at T2.		Full support

Appendix E: Overview of research on work ability and study variables

Table E1

Overview of Research on Work Ability and Mental Health

Study	Industry sector	Sample size	WA measure	Methods	Mental health outcome
Sjogren-Ronka et al., 2002	Service	88	Short	Cross-sectional survey	Significant association with WA
Knekt et al., 2008	Hospital psychiatric outpatients	459	Short (modified)	RCT	No difference in WA
Gamperience et al., 2008	Various - mixed	597	Single item	Cross-sectional	Significant association with WA
Fichera et al., 2009	Pharmaceutical	40	Short	Cross-sectional	Significant association with WA
Guidi et al., 2012	Banking	413	Short	Cross-sectional	Significant association with WA
Edlund et al., 2012	Manual workers exposed to vibration	47	Short	Cross-sectional	Significant association with WA
Silva et al., 2012	Electrical	101	Short	Mixed method	Significant association with WA
Van de Vijfeijke et al., 2013	Existing data set	8824	Single item	Longitudinal	Significant association with WA
Addley et al., 2014	Civil servants	180	Long	RCT	No difference in WA
Leijten et al., 2014	Existing data set	8411	Single item	Longitudinal	Significant association with WA
Boschman et al., 2014	Construction	423	3x items	Longitudinal	Significant association with WA
Leijon et al., 2017	General workforce	7,810	Single item	Longitudinal	Significant association with WA

Table E2*Overview of Research on Work Ability and Job Stress*

Study	Industry sector	Sample size	WA measure	Methods	Job Stress
Kloimuller et al., 2000	Transport	369	Short	Cross-sectional	Significant association with WA
Elo et al., 2003	Various – mixed sample	4958	Short	Descriptive data	Significant association with WA
Goedhard et al., 2005	Military	126	Short	Cross-sectional	Significant association with WA
Pranjic et al., 2006	Health	511	Short	Cross-sectional	Significant association with WA
Brešić et al., 2007	Oil	125	Short	Cross-sectional	Significant association with WA
Golubic et al., 2009	Health	1392	Short	Cross-sectional	Significant association with WA
Seibt et al., 2009	Teaching & Office	160	Long	Cross-sectional	Significant association with WA
Knezevic et al., 2011	Health	300	Short	Cross-sectional	Significant association with WA
Guidi et al., 2012	Banking	413	Short	Cross-sectional	Significant association with WA
Harju et al., 2014	Various – mixed sample	11 468	Single item	Cross-sectional	Significant association with WA
Viotti et al., 2017	Education	202	Modified (5 items)	Cross-sectional	Significant association with WA

Table E3*Overview of Research on Work Ability and Job Satisfaction*

Study	Industry sector	Sample size	WA measure	Methods	Job Satisfaction
Lindfors et al., 2007	Health	258	Short	Cross-sectional	Significant association with WA
Marqueze et al., 2008	Education	406	Short	Longitudinal	Significant association with WA
Reilly et al., 2009	Charity	98	Short	Cross-sectional	No significant association with WA
Silva et al., 2012	Electrical	101	Short	Cross-sectional	Significant association with WA
Palermo et al., 2013	Varied	306	Modified – 4 questions	Cross-sectional	Significant association with WA

Table E4*Overview of Research on Work Ability and Work Engagement*

Study	Industry sector	Sample size	WA measure	Methods	Job engagement
Hakanen et al., 2006	Teaching	2038	Single item Short	Cross-sectional	Significant association with WA
Gould et al., 2008	Various – population sample	5199	Single item	Cross-sectional	Significant association with WA
Airila et al., 2014	Firefighters	721 (T2)	Single item	Longitudinal	Significant association with WA
Mache et al., 2015	Health	248	Short	Cross-sectional	Significant association with WA

Table E5*Overview of Research on Work Ability and Sickness Absence*

Study	Industry sector	Sample size	WA measure	Methods	Sickness absence
Kujala et al., 2006	General population study	8767	Short	Longitudinal	Significant association with WA
Hoonakker et al (2012)	Construction	8423	Short	Longitudinal	Significant association with WA
Meyer et al., 2013	N/A – group of patients	92	Short	Cross-sectional	Significant association with WA
Lundin et al., 2015	General population study	13355	Single item	Longitudinal	Significant association with WA
Notenbomer et al., 2015	Varied	3660	Short	Cross-sectional	Significant association with WA
Schouten et al., 2015	Varied	2899	Short (modified)	Prospective	Significant association with WA
Lundin et al., 2017	General population study	6637	Short & single items	Longitudinal	Significant association with WA
Sundstup et al., 2017	General population study	10 427	Two single items	Prospective	Significant association with WA
Schouteten, 2017	Academic	242	Short	Quasi-longitudinal	Significant association with WA