

MASTER

Healthy work environments

impact of physical work environment on burnout - engagement continuum in activity based offices

Aussems, R.I.M.

Award date:
2019

[Link to publication](#)

Disclaimer

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

Healthy work environments

Impact of physical work environment on burnout – engagement continuum in activity based offices



R.I.M. (Rik) Aussems
Master thesis
January 2019, Eindhoven

Healthy work environments

Impact of physical work environment on burnout – engagement
continuum in activity based offices



Colophon

Title:	Healthy work environments
Subtitle:	Impact of physical work environment on burnout – engagement continuum in activity based offices
Author:	ing. R.I.M. (Rik) Aussems
ID:	0974044
Document:	Master thesis
Version:	Final
University:	Eindhoven University of Technology Department of Built Environment Urban Systems and Real Estate
Chairman:	prof. dr. T.A. (Theo) Arentze
Supervisors:	dr. ir. H.A.J.A. (Rianne) Appel-Meulenbroek (1 st) dr. P.M. (Pascale) Le Blanc (2 nd) prof. dr. T.A. (Theo) Arentze (3 rd)

January, 2019
Eindhoven

Preface

This thesis is the final product for completing the master Urban Systems and Real Estate at the Eindhoven University of Technology. This research studies the impact of distinct physical workplace characteristics in activity based offices on the position of workers on the burnout – engagement continuum. After eight months of hard work and dedication, I am proud to present you my master thesis. The results of this thesis would not have been the same without the people who surrounded and supported me throughout the process.

Needless to say, writing this thesis was quite a journey. For the past eight months it has taken all my energy and I can honestly say that I have learned just as much about myself as about the topic. Nonetheless, it has been a great experience with ups and downs that will guide me towards the challenges to come.

I would like to thank dr. ir. Rianne Appel-Meulenbroek for her endless patience, support, and guidance regarding the process as a whole. She provided value insights regarding the contents, feedback whenever necessary and kept me motivated at difficult times. I would like to thank dr. Pascale Le Blanc for her constructive feedback and guidance regarding the burnout and engagement content. I would also like to thank prof. dr. Theo Arentze for his supervision and feedback regarding the statistical analyses and SPSS. Their academic point of view and experience was of great support and without them the results of this thesis would not have been the same.

On a personal note, I would like to give a special word of thanks to my family who provided me the opportunity to study at the Eindhoven University of Technology and supported me mentally over the past eight months. I would like to thank C. Göbbels for her support, motivation, and commitment. I would also like to thank D. Vrijhoeven for being a major source of inspiration, and helping me to put things in perspective.

Finally, I would like to thank the people who helped distributing the questionnaire among organisations across The Netherlands, as well as the participants. Evidently, their help was essential for the results of this research.

Rik Aussems
January, 2019

Summary

Introduction

To date, over a million Dutchmen are experiencing burnout symptoms at a younger age than ever before, making job burnout the single most important occupational disease in modern work-life. Accordingly, it is important for organisations to recognise employees for being the most valuable assets of the organisation. The physical work environment can affect employee well-being both positively (engagement) and negatively (burnout), causing more and more organisations to redefine the design and structure of the workplace. Organisations have already attempted to create a synergetic balance between the employees' needs for well-being and the company's goal for profitability. More specifically, organisations searched for an office concept that would optimise the use of the available space (efficiency) and the increasing focus on communication and work-life balance. One of such concepts is activity based working, implying supportive work environments that combine hot-desking with a variety of workplaces, designed to support different types of activities (e.g. Hoendervanger et al., 2015).

The influence of distinct characteristics of activity based office environments on the burnout – engagement continuum (BEC) dimensions has never been investigated before. Existing literature tends to focus either on the independent variables such as the physical environment and the behavioural environment, or on the dependent variables such as business outcomes, productivity and employee health. Gaining clear insights in the workplace characteristics that affect employee well-being both positively (engagement) and negatively (burnout) provides (corporate real estate) managers a guideline to make well-founded accommodation decisions for incorporating activity based office concepts. The main research question that follows from this objective is as follows:

What characteristics of the physical work environment in activity based offices are related to the position of workers on the burnout – engagement continuum and how big is their influence?

This research contains a desk research (literature review) and an explorative part containing quantitative research (data collection). The data required for the quantitative research is collected by means of an online questionnaire that is distributed among knowledge workers in the Netherlands, which resulted in 184 respondents among fourteen organisations.

Literature review

Literature showed that people's relationship with their jobs is a continuum between the negative experience of burnout and the positive experience of engagement (Maslach & Leiter, 2008), hence the burnout – engagement continuum. Consensus was found regarding three interrelated dimensions, being the individual strain dimension ranging from exhaustion (B) to energy (E), interpersonal strain dimension ranging from cynicism (B) to involvement (E) and the self-evaluation strain dimension ranging from inefficacy (B) to efficacy (E). This three-dimensional model provides a more thorough perspective about people's relationship with their workplace, over and above such single concepts as organisational commitment, job satisfaction and job involvement (Maslach & Leiter, 2008, p. 499).

Although burnout can be categorised as a mental disorder, it is distinct from more severe types of mental illness. For example, a clear distinction has been established between burnout and depression, even though these two phenomena are related (Bakker et al., 2000). According to Warr (1987), depression may be 'context-free' affective well-being, while burnout concerns 'job-related' affective well-being, hence the term 'job-burnout'. Many organisational risk factors have been identified which can be summarised in *the six key domains of the workplace environment*, being

workload, control, reward, community, fairness and values. Although these domains are closely interrelated, each domain encompasses a distinct perspective to the interaction between people and their jobs (Maslach et al., 2001).

In terms of the physical work environment, various office concepts have been developed in an attempt to make optimal use of the available space and empower knowledge workers to work more efficiently and effectively. One such development is called 'new ways of working', which implies offering employees more autonomy and freedom by introducing flexible work arrangements (Blok et al., 2012). Laihonon et al. (2012) refer to non-traditional work practises, settings and locations with information and communication technologies to complement or replace traditional ways of working. The complex concept of new ways of working has often been described using three key components, being the *physical space* for productive knowledge work and meeting, the *virtual space* for knowledge sharing, and the *social space* for learning to use both the physical and digital places (Aaltonen et al., 2012). For efficiency reasons, new ways of working is often being implemented by using activity based office designs. While the terms are related, it is important to understand that they are distinct and not to be confused. Whereas new ways of working refers to the idea of a new work environment, the activity based office is the most advanced physical translation of this environment.

For the purpose of this research, five consistent constructs encompassing the physical work environment were identified, being office layout supportiveness, perceived office comfort, accessibility to ICT, office use, and possibility to telework (i.e. office location). Although the domains are closely interrelated, each domain encompasses a distinct perspective to the interaction between people and their physical work environment.

Research approach

For this research, the quantitative data has been collected by means of an online questionnaire for which a bilingual link was distributed (i.e. English and Dutch). The questionnaire was distributed online between July 10th and September 4th, resulting in 184 respondents. Compared to the Dutch nationwide average, the sample includes a relatively high percentage of females and few single households.

The variables that were identified from existing literature represented the starting point for examining the unique contribution of the physical workplace characteristics in predicting the burnout – engagement continuum dimensions. To reduce the number of variables included in the intended multiple regression analyses, data reduction was used. Accordingly, factor analysis showed that the (ten) variables associated with the *office use* component, were internally consistent when they were combined into four new factors, being interaction, distraction, desk-switching and claiming. The same mechanism applied for the situational variables, for which four new factors were found, being recognition, overload, control, and appreciation. The study continued with these factors to further analyse the data.

After extensive data description, the data was first analysed by means of bivariate analyses (BA). The main reason for performing bivariate analyses prior to the regression analyses is to exclude any variables that do not have a significant relationship with the burnout – engagement continuum to begin with. In total, 32 significant correlations were found between the dependent- and independent variables (figure 1). Six of these correlated significantly with the individual strain of exhaustion and energy, eleven correlated significantly with the interpersonal strain of cynicism and involvement, and fifteen correlated significantly with the self-evaluation strain of inefficacy and efficacy. Multiple regression analysis (MRA) was then used to determine the effect of independent variables on the burnout – engagement continuum dimensions. Two steps in each MRA were computed for each dependent variable. Accordingly, six MRAs were performed to investigate the effect of the physical workplace characteristics on the individual-, interpersonal-, and self-evaluation strain dimension, respectively. The results of the first MRA (model I) explains the amount of variance explained by all

variables but the physical workplace characteristics. For the second MRA (model II), then, the physical workplace characteristics were included so that the results show the increase in explained variance caused by the inclusion of the physical workplace characteristics.

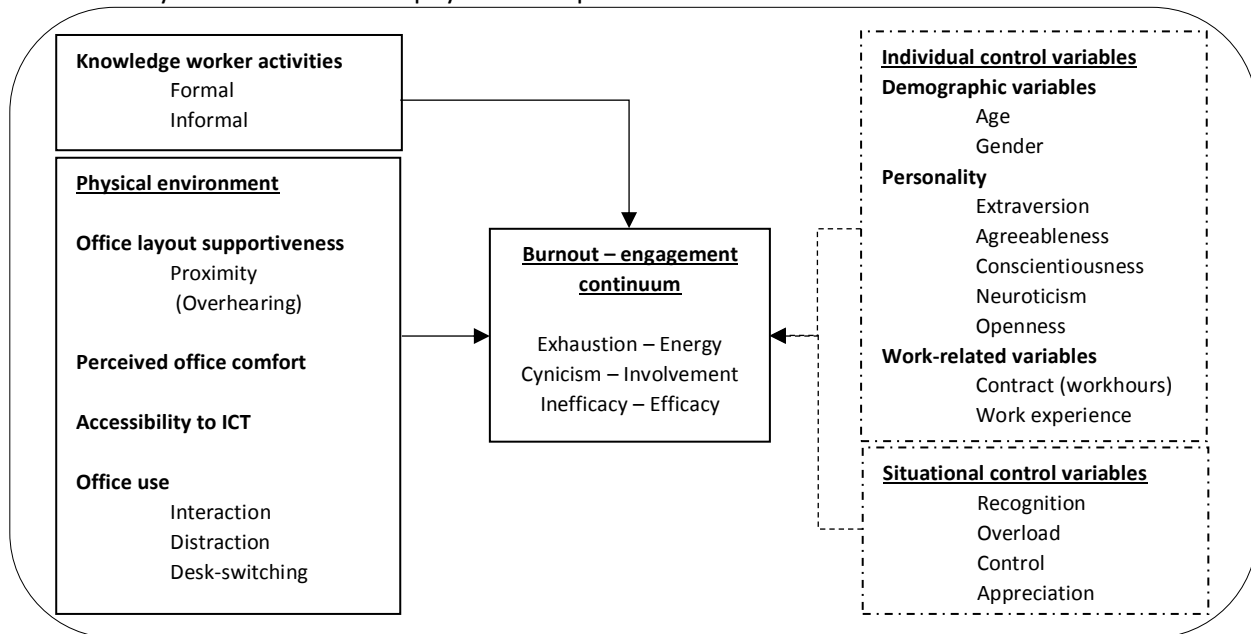


Figure 1: Overview of conceptual model after bivariate analyses

Results

Interestingly, the results imply that many variables did not have a significant relationship with the burnout – engagement continuum, even if they were significantly correlated in the bivariate analyses. Besides, variables that remained significant in the second model often showed a slightly weaker effect than they had in the first model, which seems logical given the addition of the physical workplace characteristics in the second model.

The MRAs for the individual strain dimension showed four significant relationships (Figure 2) when all variables were entered into the MRA simultaneously, being distraction (*office use*), neuroticism (*personality*), recognition and overload (*situational variables*). Similarly, the MRA for the interpersonal strain dimension showed four significant relationships (Figure 2), being formal interaction (*activities*), recognition (*situational variables*), extraversion and openness (*personality*). The MRA for the self-evaluation strain dimension showed five significant relationships (Figure 2), being control (*situational variables*), work experience (*work-related*), conscientiousness and neuroticism (*personality*), interaction and desk-switching (*office use*).

Bivariate analyses between the physical workplace characteristics and the situational variables were performed to find any indirect relationships that might contribute to predicting the burnout – engagement continuum dimensions as well. It was found that office layout supportiveness may have an indirect relationship with the individual strain of exhaustion and energy and the interpersonal strain of cynicism and involvement. In addition, it was found that the possibility to telework correlated positively with overload, indicating a potential indirect relationship between the possibility to telework and the individual strain of exhaustion and energy. On the contrary, possibility to telework correlated negatively to appreciation, indicating a potential indirect relationship between the possibility to telework and the self-evaluation strain of inefficacy and efficacy. Similar, a potential indirect relationship was found between perceived office comfort, and accessibility to ICT, respectively, and the individual strain of exhaustion and energy. An overview of the variables that are significantly related to any of the burnout – engagement continuum dimensions is shown in figure 2.

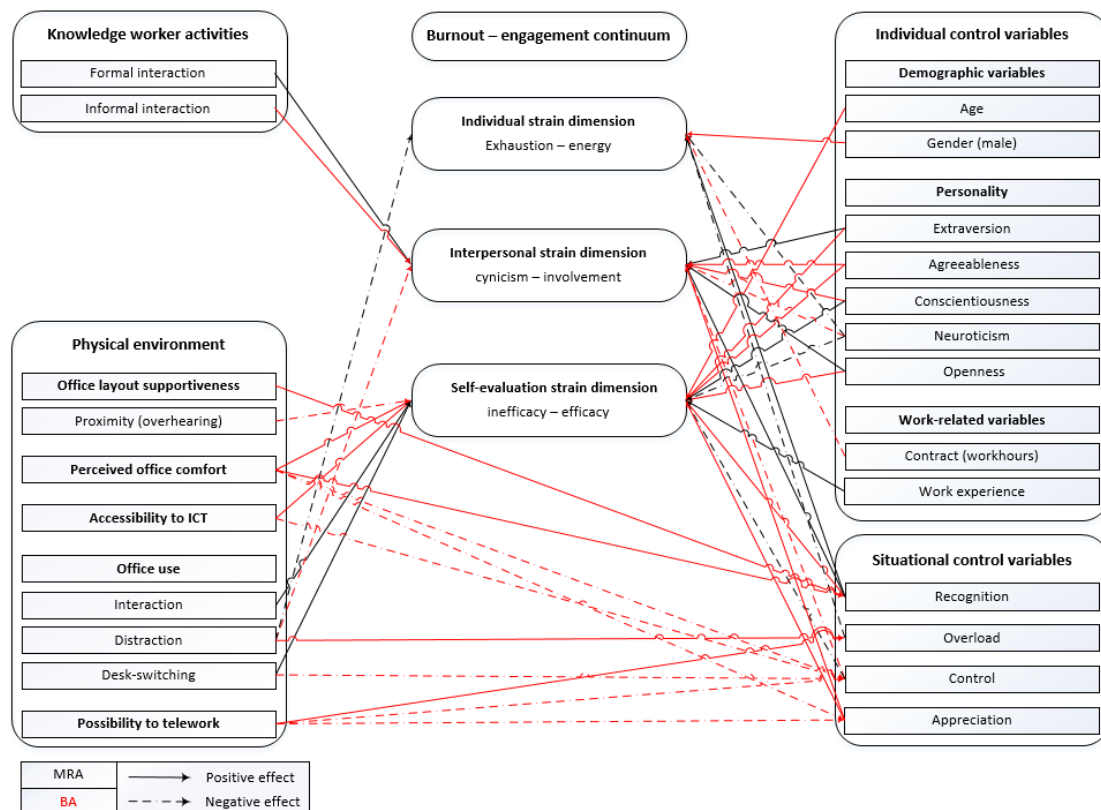


Figure 2: Research outcomes: overview of variables that have a significant relationship with the BEC dimensions

Conclusions and recommendations

This research explored the relationship between distinct physical workplace characteristics in activity based offices and the position of workers on the burnout – engagement continuum. Based on the literature review, the analyses and the interpretation of the results, it can be stated that the physical workplace has a small significant contribution to predicting the burnout – engagement continuum dimensions. In addition, it was found that work characteristics and personal characteristics are more strongly related to the burnout – engagement continuum dimensions. This was validated by the fact the no physical workplace characteristics were among the strongest predictors of the burnout – engagement continuum dimensions. However, it should be noted that the results were conform expectations since corporate real estate management is a supportive resource.

This research provided insights into the physical work environment and the different physical workplace characteristics that can be distinguished for activity based offices. It also identified different characteristics that can be linked to the burnout – engagement continuum dimensions. Lastly, this research provided new insights into the unique contribution of the physical workplace characteristics in predicting the burnout – engagement continuum dimensions.

This research mainly contributed knowledge to the field of corporate real estate management. By identifying distinct characteristics of the physical work environment in activity based office, a clear overview of physical workplace characteristics was generated that relate, somehow, to burnout or engagement. With the outcomes being a potential tool to increase productivity, this research provided additional insights for corporate real estate managers to make well-founded accommodation decisions when incorporating activity based office concepts. This research also contributed knowledge to the research field of environmental psychology, by providing more insight into the workspace needs of knowledge workers and showing consistent relationships between interaction and engagement and between distraction and burnout.

Suggestions for further research are to conduct the same questionnaire with a more representative – and larger – sample. Besides, it is suggested to investigate the in-depth relationships between the physical workplace characteristics and the situational variables (or organisational risk factors), and variables that have not yet been included. By continuing to validate the results of this study, the scales of the (*office use*) factors may be validated so that they can be used in future research. In general, it would be interesting to further investigate the physical workplace characteristics that affect the burnout – engagement continuum dimensions. It would also be interesting to continue this study and its outcomes by examining how the distinct significant (physical workplace) characteristics relate to productivity.

The results of this study can be translated into recommendations. This study showed that there are eight unique physical workplace aspects that have the potential to stimulate engagement among knowledge workers in activity based offices. The most important stimulators are associated with the *office use* component of the physical work environment. When striving towards engagement, corporate real estate managers should aim at maximising the interaction component whilst at same time minimising the distraction component. Interaction, both formal and informal, could be stimulated by means of creating a pleasant workplace culture (e.g. no desk-claiming, common break room, communication rooms). It is also important for (corporate real estate) managers to understand that workers should be better supervised when switching to unfamiliar office environments. Although it is unlikely to create workspaces that are completely distraction-free, it is recommended for corporate real estate managers to create spacious workplaces (e.g. allocation of workplaces). If needed, workers should be given the opportunity to isolate themselves from colleagues by providing various types of workplaces (e.g. cell-offices, shared-room offices, quiet areas, private areas). Activity based office concepts have the opportunity to provide both with thoughtful office design. When (re)defining the design and structure of the physical workplace, it is recommended to aim at an optimal alignment between organisational objectives for profitability and productivity and the worker goals for well-being. This is especially important since the ‘one size fits all’ activity based office does not exist. Instead, strategic management, operational management and (general) workers should combine their knowledge to achieve optimal alignment. It is important for corporate real estate managers to understand that all physical workplace characteristics need to be taken into account when creating activity based work environments that aim at supporting the employee needs. It is recommended to at least implement these physical workplace characteristics that are consistently associated with engagement, being permanent accessibility to qualitative ICT (services), spacious workplace allocation, desk-switching, (perceived) office comfort, and interaction (formal and informal). However, this does not imply that organisations should ignore other physical workplace characteristics. In addition, it is recommended for organisations to facilitate workers to come to the office at least one day a week (mandatory). This way, organisations can ensure and stimulate a sense of community among employees, in which they share praise, comfort, and happiness. Besides, it has been stated that the personal- and work-related variables are more strongly related to the burnout – engagement continuum dimensions than the physical workplace characteristics. Accordingly, it is recommended for corporate real estate managers, facility managers or property managers to consult with the human resource department for which they should focus on creating a pleasant *workplace culture* in which workers are stimulated to feel energetic, involved, and efficient.

This study also has some limitations. Complex aspects such as burnout generally require longitudinal research. This research, being a Master thesis, had a time limitation of approximately six months. As a result, longitudinal research was not possible. In addition, this study was limited to observing the *perceived* effects of respondents only. Research on the burnout – engagement continuum uses the MBI-GS to assess the three interrelated dimensions. Since this measurement was restricted by copyrights, this research used the *UBOS-GS* or *Utrechtse Burnout Schaal*.

“It always seems impossible until its done”
- Nelson Mandela

Table of contents

Colophon	iii
Preface	v
Summary	vii
1. Introduction	1
1.1. Motivation and background	1
1.2. Research objective and questions	4
1.2.1. Research objective	4
1.2.2. Research question:	4
1.2.3. Sub-research questions:	4
1.3. Conceptual model	4
1.4. Scientific and practical relevance	5
1.4.1. Scientific relevance	5
1.4.2. Practical relevance	5
1.5. Research Methodology	6
1.5.1. Desk research	6
1.5.2. Quantitative research	7
1.5.3. Model creation	7
1.6. Research Outline	7
2. The burnout – engagement continuum	9
2.1. The concept of burnout	9
2.1.1. Antecedents of burnout	10
2.1.2. Consequences of burnout	13
2.2. The concept of engagement	13
2.2.1. Antecedents of engagement	14
2.2.2. Consequences of engagement	15
2.3. The burnout – engagement continuum	16
2.4. Individual factors	18
2.5. Measurement instruments	20
2.6. Conclusions	21
3. Activity based office environment	25
3.1. Physical work environment	25
3.2. Office innovation	28
3.3. The activity based office	31
3.3.1. Knowledge worker activities	34
3.3.2. Office layout	35

3.3.3.	Office comfort	37
3.3.4.	Information and communication technology (ICT)	39
3.3.5.	Office use	40
3.3.6.	Office location	43
3.4.	Conclusions.....	44
4.	Research approach.....	47
4.1.	Data collection	47
4.1.1.	Operationalisation.....	47
4.2.	Procedure of data collection	56
4.2.1.	Reliability	57
4.2.2.	Validity.....	57
4.3.	Data description and statistical analysis	58
4.3.1.	Bivariate analysis.....	58
4.3.2.	Regression analyses.....	59
4.4.	Conclusions.....	61
5.	Data description.....	63
5.1.	Data preparation.....	63
5.1.1.	Missing values	63
5.1.2.	Recoding.....	64
5.1.3.	Reversed items.....	65
5.2.	Data description	65
5.2.1.	Socio-demographic characteristics	65
5.2.2.	Work-related characteristics	68
5.2.3.	Personality	73
5.2.4.	Situational variables	77
5.2.5.	Burnout – engagement continuum.....	79
5.2.6.	Knowledge worker activities.....	81
5.2.7.	Physical workplace characteristics	82
5.3.	Conclusions.....	88
6.	Bivariate analyses	89
6.1.	Knowledge worker activities	89
6.2.	Physical work environment	90
6.2.1.	Office layout supportiveness	90
6.2.2.	Perceived office comfort	91
6.2.3.	Accessibility information and communication technology	92
6.2.4.	Office use	92

6.2.5. Possibility to telework (office location).....	93
6.3. Situational variables.....	94
6.4. Personality.....	95
6.5. Socio-demographics.....	96
6.5.1. Gender.....	97
6.6. Work-related variables.....	98
6.6.1. Job rank	99
6.6.2. Nature of contract.....	99
6.6.3. Expectations potentials	99
6.7. Conclusions.....	100
7. Multiple regression analyses and results	103
7.1. Regression model	103
7.1.1. Theoretical background.....	103
7.1.2. Multiple regression analyses	103
7.2. Data analyses.....	112
7.2.1. Multiple regression analyses: individual strain (exhaustion – energy)	112
7.2.2. Multiple regression analyses: interpersonal strain (cynicism – involvement)	114
7.2.3. Multiple regression analyses: self-evaluation strain (inefficacy – efficacy)	116
7.3. Physical workplace characteristics.....	119
7.4. Conclusions.....	123
8. Conclusions and recommendations	125
8.1. Contribution to knowledge	129
8.2. Limitations and recommendations for further research	130
8.3. Practical implications	132
Bibliography.....	135
List of figures	151
List of tables.....	154
Appendix A	157
Appendix B	159
Appendix C.....	161
Appendix D	175
Appendix E.....	177
Appendix F.....	181
Appendix G	182
Appendix H	184
Appendix I.....	187

Appendix J	188
Appendix K	190
Appendix L	194
Appendix M	195
Appendix N	197

1. Introduction

1.1. Motivation and background

In recent years, the modern economy has been rapidly changing from an industrial to a knowledge driven economy (Haynes, 2007a; Baarne et al., 2010; Blok et al., 2012). With the growing number of knowledge workers (e.g. OECD, 1996; Davenport, 2005), organisations are forced to recognise employees for being the most valuable assets of the organisation. As a result, organisations are required to focus on employee needs in order to be able to, not only, support their satisfaction, health and productivity (Krumm & Vries, 2003; Rothe et al., 2012) but also develop a competitive advantage by attracting and retaining talented employees (Earle, 2003; Bakker & Leiter, 2010). Research shows, for example, that an optimal office design can support employees by creating an optimal person-environment fit based on the individual abilities of workers (e.g. Stallworth & Kleiner, 1996; Van Ree, 2002). Clearly, other goals have been observed in the past. Robin (2003) noted that at first, organisational health was assessed in terms of the bottom line, in which the goal of many organisations was to avoid being unhealthy, rather than optimizing health. Stress at work therefore, was able to become a major public health risk associated with heart problems, while people are experiencing burnout symptoms at a younger age than ever before (Maslach et al., 2001). Nowadays, over a million Dutchmen are experiencing burnout symptoms, with 17 percent being aged between 25 and 35 (TNO, 2015), making job burnout the single most important occupational disease in Dutch modern work-life. In many studies, burnout has been associated with various forms of negative responses to the job, including job dissatisfaction, low levels of commitment, absenteeism and destabilisation of one's work-life balance. According to Grawitch et al. (2006), these aspects can all be captured by a single term called *employee well-being*. In addition, Maslach and Leiter (2008), among others, argue that burnout has been associated with reduced productivity, underlining the importance of gaining a better insight into the early predictors of burnout.

Job stress has been recognised as an early predictor of burnout and can impair physical health, psychological well-being and work performance (Kahn & Byosiore, 1992; Sauter & Murphy, 1995). Moreover, burnout is a result of prolonged or chronic job stress. According to Hooftman et al. (2016), for example, 35 percent of the Dutch employees indicated job stress as the main cause for work-related absenteeism. In turn, research shows that that job stress and, thus, burnout is mainly caused by insufficient autonomy (44%) and excessive workload (38%) within work environments (TNO, 2015). Maslach and Leiter (2008), on the other hand, propose that people's psychological relationship to their job is a *continuum* between the negative experience of burnout and the positive experience of engagement (p.498). Although consensus was found regarding the three dimensions, being the individual strain (exhaustion (B) – energy (E)), interpersonal strain (cynicism (B) – involvement (E)) and self-evaluation strain (inefficacy (B)– efficacy (E)), literature towards burnout definitions is scarce. Maslach and Jackson (1981b), however, were able to establish burnout as “*a psychological syndrome that involves a prolonged response to chronic interpersonal stressors on the job*”. Work engagement on the other hand, is defined as the opposite of burnout; “*an energetic state of involvement with personally fulfilling activities that enhance one's sense of professional efficacy*” (Leiter and Maslach, 1998, 2008). In addition, Bakker et al. (2008) state that work engagement is “*a positive, work-related state of well-being*” and has been associated with high levels of energy, pleasure, activation and commitment (Bakker et al., 2011; Parker & Griffin, 2011). As argued by Maslach (1993), the significance of this three-dimensional model of the burnout – engagement continuum is that “*it clearly places the individual strain experience within the social context of the workplace and involves the person's conception of both self and others*” (Maslach, 1993). Moreover, the model provides a “*more*

complex and thorough perspective about people's relationships with their work, over and above such single concepts as organisational commitment, job satisfaction, or job involvement" (Maslach & Leiter, 2008; p. 499).

In the research literature on organisational risk factors correlated with burnout, a problematic relationship between the person and the environment, often referred to as misalignment, person-environment misfit or job-person incongruity (Leiter & Maslach, 2004; Maslach & Leiter, 2008; Maslach et al., 2001; Bakker & Leiter, 2010), is consistently found. Moreover, organisations have increasingly made an effort to support their employees by aligning their portfolio and services to the activities performed by its employees (Chandrasekar, 2011; Appel-Meulenbroek et al., 2011 and Kleijn et al., 2012). Thus, organisations are, not only, recognising but also acknowledging the growing burnout problem. As a result, employee health is rapidly becoming a key business factor for organisations which are only beginning to understand and interpret the implications of healthy work environments (Kirsten, 2010; Cushman & Wakefield, 2017; Lowe, 2004; Grawitch et al., 2006; Burton, 2008). Sauter, Lim and Murphy (1996) defined this healthy workplace trend by an organisation that *"maximizes the integration of worker goals for well-being and company objectives for profitability and productivity"* (p. 250). In other words, organisations attempt to create a synergetic balance between the employees' needs for well-being and the company's goal for profitability. According to Vos and Van der Voordt (2001), organisations attempt to achieve this balance by making adjustments to their physical work environment, while optimizing the efficiency of the available workspace. This alignment of accommodation, ICT and other facilities is called workspace innovation and can be very profitable for organisations since the cost of office accommodation is often the second largest expense, besides labour cost (Oladokun, 2010; Pole & Mackay, 2009). As Van Ree (2002) states, the design of an office accommodation should be seen as a resource that could impact the performance of an organisation as a whole.

Over the years, various office concepts have been developed in an attempt to make optimal use of the available space and empower knowledge workers to work more efficiently and effectively (Blok et al., 2012). One of these developments is called 'new ways of working', which implies offering employees more autonomy and freedom by introducing flexible work arrangements (Blok et al., 2012). The complex concept of new ways of working has often been described using three key components, being the *physical space* for productive knowledge work and meeting, the *virtual space* for knowledge sharing, and the *social space* for learning to use both the physical and digital places (Aaltonen et al., 2012). For efficiency reasons, new ways of working is often implemented by using 'activity based office' designs. Activity based working is supported by work environments that combine hot-desking with a variety of workplaces, designed to support different types of activities (Hoendervanger et al., 2015) and is supposed to grant the organisation cost reduction through workplace sharing (Gorgievski et al., 2010). Besides cost reduction, these concepts provide organisations with other advantages including increased productivity of employees, strengthened organisational image and improved collaboration (Van Koetsveld & Kamperman, 2011). Not surprisingly, the activity based office is rapidly being introduced worldwide (Dixon & Ross, 2011). However, unexpected negative effects have been monitored as well. Wrongful estimations of the required number and type of workplaces, for example, have led to environments that did not support the new work processes optimally and were therefore counterproductive (Brennan et al., 2002; Duffy & Tanis, 1993). As mentioned by Rashid and Zimring (2008) and Vischer (2007), such a misfit between the user and the environment can create workplace stress and negatively influence the productivity. Thus, when not implemented correctly, the activity based office concept can cause negative correlations with organisational productivity and employee satisfaction where positive correlations were expected (Appel-Meulenbroek et al., 2011). Most of the time, the office concept is implemented based on the activities conducted by employees and a managerial perception of what this means for the organisation and its work environment. The

exclusion of end-users in the decision-making process therefore, is argued to be one of the main causes for the perceived misfit, potentially causing burnout. Haynes (2007), however, points out that despite various studies in this field, no consensus has been found on the aspects of the office workspace environment that stimulate employee satisfaction and organisational performance with the exception of the fact that the behavioural environment (interaction, distraction) and the physical environment (office layout, comfort) are intertwined and cannot be seen separately from each other (Haynes, 2007). In addition, Hoendervanger et al. (2015) argue that there is hardly any evidence for the presumed effectiveness of activity based office environments regarding job performance, and neither for employee satisfaction, health and well-being. Thus, as the activity based office concept has yet to be operationally optimised, it is of interest to investigate the characteristics of the physical work environment that influence the position of workers on the burnout – engagement continuum in activity based work environments.

To date, only few studies have examined the effects of the office environment on employee health. However, extensive research has been done on the ambient effects of the indoor climate such as light, noise, air quality and temperature (Bengtsson, 2003; Heerwagen, 1990; Seppanen & Fisk, 2006) on employee health, effect of office types on health (Bodin-Danielsson & Bodin, 2008), use of specific physical work environments (Appel-Meulenbroek, 2011), activities conducted by employees in these physical work environments (Tabak, 2009) or how the occupants' perception of the indoor environment is influenced by the level of control (Lee & Brand, 2005). In addition, much research has been done on the relationship between employee satisfaction, motivation, performance and productivity (Ryan & Deci, 2000; Schaufeli et al., 2006). Furthermore, Van Ree (2002), Vischer (2007) and others have emphasised the direct relationship between the physical work environment and organisational performance, but failed to take aspects such as employee well-being, satisfaction, commitment and workload into account. Rashid and Zimring (2008), on the other hand, have emphasised the relationship between the indoor environment and stress, whereas Evans and Johnson (2000) have focussed on the relationship between stress and open-plan office noise. However, the common factor of the aforementioned studies is that they failed to take any distinct characteristics of activity based office concepts into account. This shows that to date, little research has been conducted that investigates the effects of the physical work environment on employee health, from an activity based office point of view. More specifically, there is only little empirical evidence of the characteristics of the physical work environment that influence the burnout – engagement continuum of employees in activity based office environments.

Prior research on job burnout and engagement points to the conclusion that burnout is an unpleasant and stressful condition that can cause problems for both the individual and the organisation (e.g. Maslach & Leiter, 2000, 2008; Bakker et al., 2013). Accordingly, it would be helpful for (corporate real estate) managers to increase engagement and limit burnout symptoms, so that preventive intervention measures could be more effectively implemented. The basic principle is that if individuals are experiencing some of these early signs of burnout, this information should be a trigger for organisations to consider actions to prevent burnout and build engagement. The purpose of this research therefore, is to gain more insight in the distinct characteristics of activity based work environments that influence the burnout – engagement continuum. By doing so, a guideline can be obtained that allow (corporate real estate) managers to make well-founded decisions when incorporating activity based office concepts in order to decrease burnout symptoms and increase engagement among office employees.

1.2. Research objective and questions

1.2.1. Research objective

The research objective can be derived from the background information that is explained in Section 1.1. The lack of insight into characteristics of the physical environment that may affect the burnout – engagement continuum makes it difficult for academics and (corporate real estate) managers to determine what kind of physical environment supports employee well-being best. This observation results in the following research objective:

To gain insight in the characteristics of the physical environment that influence the burnout – engagement continuum in order to increase engagement and limit burnout symptoms so that (corporate real estate) managers can make well-founded decisions when incorporating activity based office concepts.

1.2.2. Research question:

In order to reach this objective, the main research question could be stated as follows:

What characteristics of the physical work environment in activity based offices are related to the position of workers on the burnout – engagement continuum and how big is their influence?

1.2.3. Sub-research questions:

In order to be able to answer the main research question and give a clear structure to this thesis, the following sub-questions have been formulated:

1. What is the burnout – engagement continuum and how can it be measured?
2. What is the physical work environment and which different characteristics can be distinguished for an activity based work environment?
3. What is the relationship between the physical environment and the burnout – engagement continuum?
4. How big is the influence of physical workplace characteristics on the burnout – engagement continuum dimensions?

1.3. Conceptual model

Building on the existing literature, a general conceptual model was constructed for this research. This model illustrates the relationship between characteristics of the physical work environment and employee well-being. More specifically, the model shows the presumed relationship between activity based work environments and a burnout – engagement continuum (see Figure 1.1). For the purpose of this research, the individual concepts have to be defined, albeit the relevance of its specific characteristics have to be determined. In order to ensure a valid internal validity, control variables will be added to this research in which, for example, demographics are recognised. The same mechanism holds for the situational factors in which the six domains of work-life are recognised (see also Maslach et al., 2001; Maslach & Leiter, 2008).

According to the model, the physical environment may affect employee well-being both positively (engagement) and negatively (burnout). In addition, employee well-being, in terms of the burnout – engagement continuum, may also be influenced by organisational risk factors (e.g. situational variables), individual factors and work-related variables (in short: control variables).

As regards the physical environment, numerous office concepts can be distinguished, of which a few have been elaborated within the motivation and background section. However, the focus of this research will solely lie within the domain of the activity based office environment. Other office concepts, such as the traditional open-office, will therefore not be taken into account. In addition, the focus of the physical environment concerns the office level. Other aspects from the physical environment such as parking lots or external infrastructure might be referred to, but will not be taken into account.

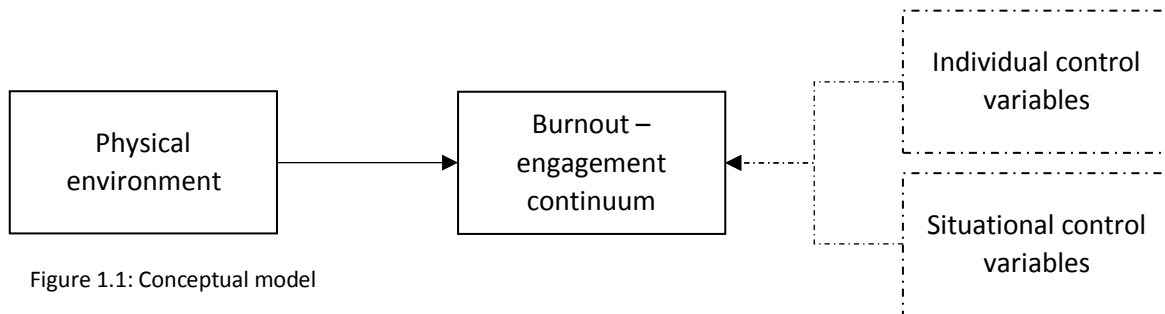


Figure 1.1: Conceptual model

1.4. Scientific and practical relevance

1.4.1. Scientific relevance

This research attempts to find out which, and to what extent, characteristics of the physical environment affect the burnout – engagement continuum. Studies aiming at the optimisation of the person-environment fit between employees and work environments are not new in research literature. Within the field of psychology, a long history exists of trying to explain employee behaviour in terms of the interaction between the person and the environment (Maslach et al., 2001). This approach can be traced back to some of the earliest models of job-person fit (e.g. French et al., 1974), which assumed that a better fit predicts better adjustment and less stress. So, for decades academics have been trying to get a better understanding of the relation between the physical environment and employee well-being. However, it remains a difficult field to study due to the complexity of the individual needs and behaviour. Despite the fact that some research has been done on burnout and engagement in relation to aspects of the physical environment, the influence of distinct characteristics of activity based office environments on the burnout – engagement continuum dimensions has never been investigated before. Existing literature tends to focus either on the independent variables such as the physical environment and the behavioural environment, or on the dependent variables such as business outcomes, productivity and employee health. This research therefore, aims to contribute to this area of research by shedding new light on the underexposed relationship of the specific characteristics of the physical environment, namely the activity based work environments, on the burnout – engagement continuum, while research outcomes may be used to extent and interpret existing literature.

1.4.2. Practical relevance

Over the years, the effects of burnout and engagement have been studied extensively, giving a clear view of the organisational consequences burnouts bring along. By identifying characteristics of the work environment that increase engagement and limit burnout symptoms, organisations may increase their knowledge on how to deal with burned-out employees, or even better, prevent them from burning out in the first place. In addition, organisations may increase their knowledge on how to stimulate and retain engagement among employees. This research, therefore, is relevant for all kinds of organisations since almost every organisation has human capital. As emphasised by Pole and

Mackay (2009), labour cost is the most costly resource of an organisation, followed by the costs of office accommodation. According to the World Green Building Council (2016), approximately 90 percent of the business operating costs, such as salary, illness and bonuses, are linked to employees. On the other hand, more satisfied employees are most likely more engaged employees and, thus, more productive employees (Edwards, 2015). This is also acknowledged by Grawitch et al. (2006), who state that *“the establishment of a healthy workplace leads to a healthier and more productive workforce, which translates into increased productivity and a competitive advantage for the organisation”* (p131). As a result, organisations are required to focus on the employee needs for well-being in order to be able to, not only, support their well-being and productivity (Krumm & Vries, 2003; Rothe et al., 2012) but also develop a competitive advantage by attracting and retaining talented employees (Earle, 2003; Bakker & Leiter, 2010). Taken into account that a more satisfied employee is more productive one, even a one percent improvement in satisfaction, and thus productivity, can have a major impact on the bottom line and competitiveness of any organisation. Gaining a better understanding of workplace characteristics that may affect employee well-being both positively (engagement) and negatively (burnout) gives (corporate real estate) managers a guideline to make well-founded accommodation decisions when incorporating activity based office concepts.

1.5. Research Methodology

This research can be divided into three clear sections. The first part is a desk research, followed by an explorative research in the second part. The third part of this research combines the findings by creating a model and provides conclusions and recommendations. The methods are further elaborated below.

1.5.1. Desk research

Desk research is generally used to describe various aspects of phenomena. Moreover, it is characterised as the attempt to determine, describe or identify what is (Ethridge, 2004). Although desk research is very effective to analyse non-quantified issues, it cannot test or verify research problems statistically. Accordingly, desk research is often combined with quantitative research.

Literature research

The first part of this research is of descriptive nature and focuses on the existing literature. Within this part of the research, literature (e.g. research papers, articles and other publications) are brought together in order to give a concise and clear view of the available and existing knowledge regarding the subject. The aim of this part is to define the unique elements within the conceptual model and provide a clear overview of the characteristics of each of the concepts. This is done by performing a literature study, part of the qualitative research methods, in which it is attempted to provide answers to sub-questions 1 and 2. This review results in an operationalisation of the specific elements of the conceptual model, which then can be used as input to generate the questionnaire for the second part of the research. This part concludes with a theoretical framework, so that the theoretical boundaries of this research are established.

1.5.2. Quantitative research

Quantitative research is generally used to describe and test the relationships between numerically measured variables by using statistical analyses. Moreover, it repeatedly examines the relationships between a dependent variables and one or multiple independent variables. However, quantitative research requires preliminary data (collection, e.g. by means of a questionnaire) to be able to test the relationships.

Data collection and analyses

The second part of this research is of explorative nature and attempts to provide an answer to the third research question. The aim of this part is to generate a clear questionnaire covering all of the elements and distribute it among a sufficiently large sample, containing employees (knowledge workers) in activity based office environments located in The Netherlands. As a result, the analysed data and the results of this survey (questionnaire) refer to the situation of The Netherlands. All data required for this research will be collected by using this questionnaire.

When developing a research design, a choice can be made between a longitudinal and a cross-sectional research design. Both studies are observational, so that the study environments cannot be manipulated. Commonly, complex aspects, including burnout, require longitudinal research in which researchers can document certain developments over time and make series of observations (e.g. IWH, 2015). However, this research, being a Master-thesis, has a time limitation of approximately six months. As a results, longitudinal research was not possible and therefore, this research can be classified as a cross-sectional study.

Regression analysis

In order to analyse the data, various research techniques will be used. The main research technique used for this study is regression analysis as it provides an answer to the fourth research question. In addition, a correlation-analysis is conducted as well as a factor analysis for combining the variables.

Regression analysis is used to determine the nature (e.g. strength and direction) of the relationships between each dependent variable and one or more independent variables, and is based on a set of assumption. Chapter 4 elaborates on the assumptions into more detail. Besides regression analysis, correlation-analysis is used to find out whether any variables or characteristics are correlated with each other. Finally, Principal Axis Factoring (PAF) is conducted to summarise the variance in the data and to provide insight in the coherence of the data.

1.5.3. Model creation

Once the data is collected, prepared and analysed, the third part of this research is used to create a model (regression equation), draw conclusions, formulate the implications and prepare recommendations for further research. In this section, the main research question will be answered after which an extensive discussion will be written.

1.6. Research Outline

This research has been divided into different phases in which eight chapters are addressed. Figure 1.2 illustrates the structure of this study. The first phase is the initial phase in which the motivation and background of this study are presented. In addition, the objective, research questions, conceptual model, relevance, methodology and research outline are formulated. Together, these aspects form the first chapter of this research. The second phase is the desk research. Accordingly, the first two sub-questions are addressed by means of a literature study in Chapter 2 and Chapter 3. More

specifically, the second chapter addresses the burnout – engagement continuum, while the third chapter addresses the activity based office environment. This phase concludes with a theoretical framework which includes the variables and characteristics of influence for this study. The third phase is the explorative research phase in which the quantitative research is conducted. Chapter 4 explains the research approach and primarily focuses on the data selection used as input for the questionnaire. This chapter ends with the distribution of the final questionnaire. In chapter 5, the data is received, described and prepared for analyses. Subsequently, the data is analysed in Chapter 6 (bivariate analyses) and Chapter 7 (multiple regression analyses), after which an answer to sub-question three and four is provided. In the final phase, an answer to the main research questions is provided. In addition, Chapter 8 addresses the conclusions and recommendations, after which an extensive discussion will be written.



Figure 1.2: Research design

2. The burnout – engagement continuum

This chapter introduces the burnout – engagement continuum (BEC). As mentioned in Chapter 1, the burnout – engagement continuum entails three interrelated dimensions, being exhaustion – energy, cynicism – involvement, and inefficacy – efficacy. This chapter, however, attempts to elaborate and estimate the individual constructs of burnout and engagement in order to get a better understanding of these constructs. As a result, the concept of burnout and engagement are discussed from a psychological point of view, rather than a real estate or (corporate real estate) managers (CREM) point of view. In other words, this chapter does not yet discuss real estate-related characteristics of the constructs. The chapter is divided into five main sections in which a clear division has been made between burnout and engagement. First, the concept of burnout is explained. Accordingly, the antecedents and consequences of burnout are elaborated. Next, the concept of engagement is explained. Similar to the burnout section, this section includes an elaboration of the antecedents and consequences of engagement. The third section provides an in-depth explanation of the relationship between burnout and engagement and how these concepts are combined in the burnout – engagement continuum. Next, a series of control variables are introduced which have to be taken into account when examining the constructs of burnout and engagement. The fifth section discusses various types of measures used in previous and contemporary burnout and engagement research. This chapter ends with a conclusion and an answer to the first sub question: What is the burnout – engagement continuum and how can it be measured?

2.1. The concept of burnout

The burnout – engagement continuum, as the name implies, consists of two main dimensions being burnout and engagement. The term burnout was first used in the 1970's in the United States by H. Freudenberger, a psychiatrist working in the alternative healthcare industry, to describe the gradual emotional depletion and loss of motivation and commitment which he observed among people working in the service industries (Maslach et al., 2001; Bakker et al., 2013). Based on these observations, Freudenberger (1974) defined burnout as “*a state of mental and physical exhaustion caused by one's professional life*”, referring to “*the extinction of motivation or incentive, especially where one's devotion to a cause or relationship fails to produce the desired results*”. Thus, individuals who burn out from their work deplete their energetic resources and lose their dedication to work (Bakker et al., 2013).

During the same time period, C. Maslach, a social psychologist studying emotions at work, and colleagues found that human-service workers used the term burnout and indicated that they experienced feelings of exhaustion, had developed negative attitudes toward their clients and felt that they lacked the professional competence needed to do their jobs (Schaufeli et al., 2009b). Based on these findings, Maslach and Jackson (1981b) defined burnout as “*a psychological syndrome that involves a prolonged response to chronic interpersonal stressors on the job*”, characterised by emotional exhaustion, depersonalization and a lack of personal accomplishment. Of the three dimensions of burnout, the exhaustion component is the most widely reported and most thoroughly analysed (Maslach et al., 2001; Maslach & Leiter, 2008).

The exhaustion component represents the central individual strain dimension of burnout and refers to feelings of being overextended and depleted of one's emotional and physical resources (e.g. Maslach et al., 2001). It was clear that the provision of service and care is very demanding and that emotional exhaustion is not an uncommon response to such job overload (Maslach et al., 2001). So, exhaustion is not something that is simply experienced. Rather, it stimulates actions to distance

oneself emotionally and cognitively from one's work to cope with the work overload (Maslach et al., 2001). The depersonalisation component represents the interpersonal context dimension of burnout and refers to a negative or excessively detached response to various aspects of the job (e.g. Maslach et al., 2001). In line, Maslach et al. (2001) argue that *"moderating one's compassion for clients by emotional distance from them was viewed as a way of protecting oneself from intense emotional arousal that could interfere with functioning effectively on the job"* (p. 400). The distinctiveness of the burnout phenomenon can be found in the interpersonal framework. Depersonalisation, or distancing is an immediate reaction to exhaustion, and therefore a strong relationship between exhaustion and depersonalisation is found consistently throughout burnout research (Maslach et al., 2001; see also Maslach & Leiter, 2005; 2008). Thus, according to Maslach and Leiter (2000), *"if one were to look at burnout out of context and simply focus on the individual exhaustion component, one would lose sight of the phenomenon entirely"* (p. 368). The component of reduced personal accomplishment represents the self-evaluation dimension of burnout and refers to feelings of incompetence and declined personal achievements at work (e.g. Maslach et al., 2001; see also Maslach & Leiter, 2008).

Initially, burnout was a very slippery concept and people used the term referring to different meanings (Maslach et al., 2001). A basis for constructive communication about the problem and its solutions, therefore, was absent. Researchers rejected the idea that burnout is exclusively found in the human service industry and adopted the first conceptualisations of burnout to make it applicable to workers in various industries (Bakker et al., 2013). For example, Schaufeli et al. (1996) replaced the depersonalisation component of burnout with cynicism, reflecting a distant attitude towards work in general and not necessarily toward other people. In addition, the authors replaced the component of reduced personal accomplishment with reduced professional efficacy, referring to social and non-social aspects of occupational accomplishment (Bakker et al., 2013).

Although burnout can be categorised as a mental disorder, it is distinct from more severe types of mental illness. For example, a clear distinction has been established between burnout and depression, even though these two phenomena are related (Bakker et al., 2000), while some research has found that burnout is predictive of depression and other emotional symptoms (Greenglass & Burke, 1990). According to Warr (1987), depression may be 'context-free' affective well-being, while burnout concerns 'job-related' affective well-being. In other words, depressive individuals not only experience a loss of energy during work, but during other activities as well. Burned-out individuals, on the other hand, experience a similar loss of energy primarily at work, hence the term 'job-burnout'. The latter group may still feel satisfied and productive during other activities.

2.1.1. Antecedents of burnout

In general, researchers and academics have classified the antecedents of burnout into two main dimensions, being: situational factors (e.g. work overload, job autonomy, etc.) and individual factors (e.g. neuroticism, self-efficacy, etc.) (Bakker & Demerouti, 2008; Bakker et al., 2013; Maslach et al., 2001). Current literature, however, indicates that stressful aspects of the work environment are more important predictors of burnout than is personality (Bakker et al., 2013).

Antecedents of burnout are often indicated in terms of job demands and job resources. For example, Lee and Ashforth (1996) conducted a meta-analysis showing that job demands, or stressors, are more important predictors of burnout than lack of job resources. According to Demerouti et al. (2001), job demands are aspects of the job that require sustained physical, emotional, or cognitive effort. As Bakker et al. (2000) pointed out, prolonged exposure to high job demands may lead employees to become chronically exhausted and distance themselves psychologically from their work (cynicism). Moreover, they may start to experience burnout (Bakker et al., 2000). In addition, Lee and Ashforth (1996) found that some job demands were predictors of burnout, with role ambiguity, role conflict, role stress, stressful events, workload and work pressure being the most important ones. The

authors argue that job demands are perceived as organisational losses because *“meeting such demands requires the investment of valued resources”* (Lee & Ashforth, 1996, p. 129).

Whereas Bakker et al. (2013) speak of job demands as a single concept, Maslach et al. (2001) argue that job demands can be classified into both quantitative and qualitative job demands. They found out that quantitative job demands such as experienced workload and time pressure are strongly and consistently related to burnout, particularly to the exhaustion dimension (Maslach et al., 2001). Studies of qualitative job demands, on the other hand, focus primarily on role conflict and role ambiguity and show moderate to high correlations with the cynicism and inefficacy components of burnout. According to Maslach et al. (2001), *“role conflict occurs when conflicting demands at the job have to be met, whereas role ambiguity occurs when there is lack of adequate information to do the job well”* (p. 407).

According to Bakker and Demerouti (2007), job resources are those physical, psychological, social and organisational aspects of the job that help to either achieve work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning and development. Moreover, job resources play a buffering role in the relationship between job demands and burnout. Bakker et al. (2005a), for example, found that work overload, emotional demands, physical demands and work-home interference did not result in high levels of burnout if employees experienced autonomy, received feedback and had social support from either co-workers or supervisors at the same time. This combination of high job demands and low job resources significantly added to the prediction of the exhaustion and cynicism components of burnout (Bakker et al., 2005a). However, social support from supervisors appears to be more important than (social) support from co-workers (Maslach et al., 2001). But, although the influence of job resources on burnout is less strong than that of job demands, they still have a consistent negative effect on burnout, especially on the cynicism component. So, workers who experience insufficient opportunities for development, do not receive regular feedback and cannot work with a variety of tasks are more vulnerable to burnouts (Bakker et al., 2013).

It is argued that burnout involves a later point in the stress-process, in which the person has been working for a while and is experiencing a more chronic misfit between the person itself and the job (Maslach et al., 2001). Maslach and Leiter (1997) were one of the early adopters of this phenomenon and began to address this challenge by formulating a model that encompasses the degree of (mis)match between the person and six domains of the work environment. They argued that the greater the gap, or mismatch, between the person and the job, the greater the likelihood of experiencing burnout. However, this model was twofold, so conversely, the greater the match, or fit, the greater the likelihood of experiencing engagement. According to them, mismatches arise when people are unable to establish a psychological contract leaving critical issues unsolved, or when people's working relationship changes to something that they cannot accept (Maslach & Leiter, 1997) (see also Maslach et al., 2001). So, many organisational risk factors have been identified which can be summarised in *the six key domains of the workplace environment, being ‘workload’, ‘control’, ‘reward’, ‘community’, ‘fairness’ and ‘values’* (Maslach et al., 2001; Leiter & Maslach, 2004; Maslach & Leiter, 2008). Although these domains are closely interrelated, each domain encompasses a distinct perspective to the interaction between people and their jobs and together these domains encompass the major organisational antecedents of burnout (Maslach et al., 2001).

‘Workload’, or excessive overload, is one of the most commonly discussed antecedents of burnout and refers to job demands that are exceeding the human limits. The critical point of workload occurs when people are unable to recover from these demands. In general, workload has a consistent relationship with the exhaustion component of burnout (Maslach et al., 2001; see also Maslach & Leiter, 2008). ‘Control’ often refers to indications that individuals have insufficient control over the resources required to do their jobs. It can also refer to a lack of authority to pursue the work in a way

that they believe is the most effective one (Maslach et al., 2001). A major control problem occurs when people experience role conflict, while role ambiguity (the absence of direction in work) is also associated with greater burnout (Maslach & Leiter, 2008). On the contrary, Leiter (2005) argues that control over these workplace hazards (e.g. role ambiguity) increases employee's energy and health at work. In general, (a lack of) control is related to the inefficacy component of burnout (Maslach et al., 2001). Role conflict, however, is closely related to the exhaustion component of burnout (Maslach et al., 1996; see also Maslach & Leiter, 2008), while (a lack of) feedback is generally related to all three components of burnout (Maslach et al., 2001). Insufficient 'rewards', whether financial, institutional or social, or a lack of appropriate rewards devaluates both the work and the workers and is closely related with feelings of inefficacy (Maslach et al., 1996; see also Maslach et al., 2001). In addition, Maslach et al. (2001) argue that intrinsic rewards, such as pride in doing something important, can also be part of this domain. 'Community' refers to the overall quality of social interactions at work, including issues of conflict, mutual support, closeness and the capacity to work as a team (Maslach & Leiter, 2008). According to Maslach et al. (2001), *"people thrive in community and function best when they share praise, comfort, happiness and humour with people they like and respect"* (p. 415). They argue that chronic and unresolved conflicts with others on the job are the most destructive aspect of community, as it produces constant negative feelings of frustration and hostility. In general, supervisor support has been associated with less exhaustion, while co-worker support is more closely related to efficacy (Maslach & Leiter, 2008). 'Fairness' refers to the extent to which decisions at work are perceived as being fair and equitable and communicate respect, confirming people's self-worth. Fairness of the process is perceived to be more important than favourable outcomes of the process. Unfairness occurs when there is inequity of workload or reward, when there is cheating or when evaluations and promotions are handled inappropriately (Maslach et al., 2001). A lack of fairness is generally associated with both the exhaustion and cynicism components of burnout (Maslach et al., 2001). 'Values' refer to the cognitive-emotional power of job goals and expectations (Maslach & Leiter, 2008). They argue that *"values are the ideals and motivations that originally attracted people to their jobs, and thus they are the motivating connection between the worker and the workplace (...)"* (Maslach & Leiter, 2008, p. 501). When a conflict of values occurs at the job, workers will find themselves making a trade-off between the work they want to do and the work they have to do (see also Maslach et al., 2001; Maslach & Leiter, 2008). A conflict in values is generally associated with all three components of burnout (Leiter & Harvie, 1997; see also Maslach & Leiter, 2008).

Subsequently, a 'mismatched' or burnout profile, according to Maslach and Leiter's (1997) conceptualisation of the six domains of the work environment, would include excessive workload, feelings of insufficient authority and control, lack of recognition and reward, a chronic distant work community, unfairness, and conflicting and monotonous work. According to Maslach et al. (2001), it is not exactly clear how much of a mismatch people are willing to tolerate. Instead they argue that this may depend on both the particular domain of mismatch and the relationship with the other five domains. However, Maslach and Leiter (2008) attempted to identify early predictors of burnout and engagement by predicting changes in burnout over time, based on these six areas of work-life. In their study, the tipping point of (not) experiencing burnout turned out to be the domain of 'fairness'. They pointed out that *"if people were experiencing problems with fairness in the workplace (such as favouritism, unjustified inequities or cheating) their early warning pattern was likely to develop into burnout over time"* (Maslach & Leiter, 2008, p. 508). However, the authors emphasise that the findings should be viewed with caution, since the results have to be controlled for external validity.

2.1.2. Consequences of burnout

Burnout is associated with a wide range of negative consequences. As burnout is a syndrome of chronic exhaustion and negative attitude towards work (Freudenberger, 1974), it can be expected that burnout influences people's functioning in an unfavourable way (Bakker et al., 2013). As noted by Maslach et al. (2001), the significance of burnout lies in its link to important outcomes. For example, people who are chronically exhausted and cynical about their work, experience more psychological and physical health problems (Schaufeli & Enzmann, 1998; Shirom et al., 2005). In addition, Ahola (2007) found that burnout is related to increased prevalence of depressive and anxiety disorders, while Hillhouse et al. (2000) found that patient-related exhaustion predicts mood disturbance over a period of one year. Furthermore, research has demonstrated that burnout may lead to poor physical health and increased sickness absence, or absenteeism (e.g. Kim et al., 2011). In general, the findings suggest that health related outcomes are most strongly related to the exhaustion component of burnout (Bakker et al., 2013).

Although these aspects are important health-related outcomes, organisation may be more interested in job-related outcomes. One crucial job-related outcome of burnout is job performance. By testing the relationship between the three dimensions of burnout, being exhaustion, cynicism and inefficacy, and work performance, Wright and Bonett (1997) were among the first authors who found empirical support for the relationship between burnout and performance (Bakker et al., 2013). They found that emotional exhaustion negatively predicted subsequent work performance, whereas depersonalisation (cynicism) and personal accomplishment (efficacy) showed nonsignificant relationships. Furthermore, Schaufeli et al. (2009a) found evidence for the relationship between burnout and absenteeism. More specifically, they found that burnout predicted future absence duration, but not absence frequency (Schaufeli et al., 2009a). In addition, Borritz et al. (2006) found that an increase in burnout is positively related to an increase in sickness absence days per year.

In different studies, burnout also has been associated with various forms of other negative responses to the job, including job dissatisfaction, low levels of commitment and destabilisation of one's work-life balance. According to Grawitch et al. (2006), these aspects can all be captured by a single term called 'employee well-being'. In addition, Maslach and Leiter (2008), among others, argue that burnout has been associated with reduced productivity, underlining the importance of gaining a better understanding of the early predictors of burnout.

2.2. The concept of engagement

Unlike burnout, the concept of engagement was not introduced until the 1990's when Kahn (1990) conceptualised it as the *"harnessing of organisation member's selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances"* (p. 694). Moreover, engaged people can relate or identify with their work and, therefore, put a great deal of effort into it. According to Bakker et al. (2008a), it is research on burnout that has stimulated contemporary research on work engagement. Accordingly, they argued that unlike people who experience burnout, engaged employees have a sense of energetic and effective connection with their work. In addition, engaged employees see their work as challenging, opposed to stressful and demanding (Bakker et al., 2008a).

The authors argue that work engagement is *"a positive, work-related state of well-being or fulfilment, characterised by high levels of energy and strong identification with one's work"* (Bakker et al., 2008a). Maslach and Leiter (1997; 2008) defined work engagement as the opposite of burnout; *"engaged employees have a sense of energetic and effective connection with their work"* and *"(...) is characterised by energy, involvement, and professional efficacy, the direct opposites of the three burnout dimensions"* (being, exhaustion, cynicism and inefficacy) (Maslach & Leiter, 1997; 2008).

Subsequently, Maslach and Leiter (2008) defined work engagement as *“an energetic state of involvement with personally fulfilling activities that enhance one’s sense of professional efficacy”*. Based on these definitions, it is clear that engaged employees experience high levels of energy, relate to their work by feeling involved and have a strong sense of self-effectiveness.

Maslach and Leiter (1997) argue that, in the case of burnout, energy turns into exhaustion, involvement into cynicism, and efficacy into ineffectiveness (or inefficacy). Thus, what started out as important, meaningful and challenging work becomes unpleasant, unfulfilling and meaningless (Maslach & Leiter, 1997). From their study, two typical profiles eroded; a typical burnout profile with high scores on exhaustion and cynicism and low scores on efficacy versus a typical engagement profile with low scores on exhaustion and cynicism and high scores on efficacy.

However, some scholars stress an alternative view of work engagement. Consequently, work engagement is considered to be an independent, distinct concept that is negatively related to burnout and defined as *“a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication, and absorption”* (Schaufeli et al., 2002, p. 74). ‘Vigour’ refers to a condition in which workers experience high levels of energy, have the willingness to invest effort into work and are persistent even in times of difficulties. ‘Dedication’ refers to being strongly involved in one’s work, whilst being inspired and challenged at the same time. ‘Absorption’ refers to a condition in which workers are fully concentrated and do not want to stop performing work-related activities (see also Schaufeli et al., 2006; Bakker et al., 2013). But, although different terms are given to the dimensions, they clearly indicate similar components of the concept work engagement.

2.2.1. Antecedents of engagement

In contrast to burnout, which is influenced mostly by job demands, job resources are found to be the most important predictors of work engagement (Halbesleben, 2010; Schaufeli & Bakker, 2004). According to Schaufeli and Bakker (2004) and Bakker and Demerouti (2007), job resources are those aspects of the job that help to achieve work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning and development. They elaborate job resources as, for example, social support from both co-workers and supervisors, supervisory coaching and performance feedback (Schaufeli & Bakker, 2004).

The effects of job resources on work engagement is also found by Mauno et al. (2007) who found that those employees with higher levels of job control reported higher levels of all three work engagement components, being, energy, involvement and efficacy. This has also been confirmed by Halbesleben (2010) and Christian et al. (2011) who found that the relationship between job resources and work engagement was much stronger than the relationship between job demands and work engagement. More specifically, Christian et al. (2011) found that job resources such as task variety, task significance, autonomy, feedback and social support correlated most strongly with work engagement. Bakker et al. (2011) argue that employees are more likely to be engaged when they *“perceive that their organisation provides a supportive, involving, and challenging climate, and hence accommodates their psychological needs”* (p. 79). Moreover, employees require a climate for engagement that stimulates them to be engaged. According to George (2010), *“it would seem to be especially important for employees to be engaged at work when there are real problems and the need for improvements and change”* (p. 259), indicating that engagement, as well as burnout, is not a permanent state of mind but can differ in time.

Bakker et al. (2007) observed something similar, as job resources were found to influence employee’s work engagement especially when they are confronted with high levels of job demands. Thus, job resources also contribute to work engagement whilst dealing with job demands at the same time. These effects have been found within time, over time, and also from day to day (Bakker et al., 2013).

Opposite to burnout, Maslach and Leiter (1997) argued that the greater the match, or fit, between the person and six domains of the work environment, the greater the likelihood of experiencing engagement. To recall, *the six key domains of the workplace environment are 'workload', 'control', 'reward', 'community', 'fairness' and 'values'*. So, although these domains are closely interrelated, each domain encompasses a distinct perspective to the interaction between people and their jobs and together they encompass the major organisational antecedents of engagement (Maslach et al., 2001; see also Leiter & Maslach, 2004; Maslach & Leiter, 2008).

Opposite to 'workload', or excessive overload, is a sustainable workload which, according to Landsbergis (1988), provides opportunities to use and refine existing skills as well as to become effective in new areas of activities (see also Maslach & Leiter, 2008). In general, sustainable workload has a consistent relationship with the energy component of engagement. Leiter (2005) argues that 'control' over workplace dangers increases employee's energy and health at work. In addition, Maslach and Leiter (2008) suggest that active participation in organisational decision-making is consistently associated with higher levels of efficacy and lower levels of exhaustion. A congruence in 'rewards' between the person and the job, in contrast to a lack of recognition or rewards, allows employees to have both material rewards and opportunities for intrinsic satisfaction and pride (Richardsen et al., 1992; see also Maslach & Leiter, 2008). Sufficient rewards or recognition generally increase the perceived value of both the work and the workers and is closely related with feelings of efficacy. According to Maslach and Leiter (2008), 'community' is the overall quality of social interaction at work and all its facets. However, a distinction has been found between supervisor support and co-worker support. Whereas supervisor support has been associated with exhaustion, co-worker support is more closely related to feelings of accomplishment or efficacy. But regardless of its specific form, Leiter and Maslach (1988), among others, argue that social support has been found to be associated with greater engagement. In other words, engagement is more likely to occur within a positive and supportive workplace environment (see also Maslach & Leiter, 2008). 'Fairness' refers to the extent to which decisions at work are perceived as being fair and equitable. Employees are more likely to experience feelings of engagement if they perceive their supervisors as both fair and supportive. Engaged employees, then, become more accepting of major organisational changes (Leiter & Harvie, 1997). Fairness is generally associated with greater feelings of energy and involvement. On the positive side of 'values', Leiter et al. (2007) found that consistent organisational and personal values on knowledge sharing are generally related to feelings of greater professional efficacy (see also Maslach & Leiter, 2008).

Consequently, a 'matched' or engaged profile, according to Maslach and Leiter's (1997) conceptualisation of the six domains of the work environment would include *"a sustainable workload, feelings of choice and control, appropriate recognition and reward, a supportive work community, fairness and justice, and meaningful and valued work"* (Maslach et al., 2001, p. 417).

2.2.2. Consequences of engagement

Consistent throughout literature research on work engagement is the positive relationship with health-related outcomes and job-related outcomes. Sonnentag et al. (2012) identified a possible explanation for the positive link between engagement and health by emphasising that engaged workers are more willing to participate in leisure-time activities. Opposite to burnout, this willingness to participate in leisure-time activities such as sports and exercise, social activities and other hobbies, may foster relaxation and psychological detachment from work (Sonnentag et al., 2012; Ten Brummelhuis & Bakker, 2012). Moreover, people who are actively participating in leisure-time activities may be better able to recover from job demands.

In general, research suggests that engaged employees experience more active and positive emotions than non-engaged employees do. Schaufeli and Van Rhenen (2006), for example, found that

engaged workers experience more energetic, inspired and enthusiastic feelings and emotions than non-engaged workers. In addition, Fredrickson (2001) argued that engaged workers appear to be more open to new experiences, explore their work environments and, in doing so, become more creative. This is also acknowledged by Bakker and Demerouti (2008) who argued that engaged workers are, indeed, more creative.

In line with the above, the authors found evidence that engaged workers are more productive and hard-working than non-engaged workers (Bakker & Demerouti, 2008). In turn, this is supported by Demerouti and Cropanzano (2010) who noted that engaged employees achieve better performances since work engagement (in particular the energy component) allows people to move on from thought to action. They emphasise that engaged employees are more likely to perform actions that go beyond their own responsibilities and are, therefore, beneficial for the organisation as a whole (Demerouti & Cropanzano, 2010). Furthermore, Xanthopoulou et al. (2009a) found a positive relationship between work engagement and financial returns, suggesting that work engagement is an important predictor of organisational performance as well.

Consequently, based on previous research, Bakker (2009) reports four possible explanations for the positive relationship between engagement and performance. Bakker argues that engaged employees perform better because they experience positive emotions, stimulating them to look for new ideas and build resources. This phenomenon is also called job crafting and is closely related to the energy (or vigour) component of work engagement. This is also acknowledged by Parker et al. (2010), who proposed that work engagement (particularly the energy component) stimulates proactive behaviours such as job crafting. In addition, Bakker (2009) argues that engaged employees have better health, which allows them to devote their energy to their jobs, which is commonly associated with the energy component of work engagement. Engaged employees also tend to actively pursue feedback and support to create new resources. Generally, this is closely related to the efficacy component of work engagement. Furthermore, engaged employees have the ability to transmit their engagement to colleagues, thereby increase team performance (Bakker, 2009), which in turn is closely related to the involvement component of work engagement.

2.3. The burnout – engagement continuum

According to Bakker et al. (2011), it is widely agreed that work engagement is the combination of the capability to work and the willingness to work, which is the opposite of burnout – the incapability to work and the unwillingness to work. For employees to be able to be engaged, a balance must be achieved between the level of pleasure (referring to job resources) and the level of activation (referring to job demands) (Russell, 2003). Opposite, for employees to experience burnout, they are most likely feeling unpleasant and deactivated. These patterns form the basis of a model of occupational well-being, called the job demands-resources (JD-R) model (Bakker & Demerouti, 2007; 2014) (see also Bakker et al., 2011).

According to the authors, the JD-R model supports them in understanding, explaining and predicting employee burnout, work engagement and outcomes. Russell (2003) pointed out that a core affect lies at the basis of any emotion. This neurophysiological state is consciously accessible for any mood or emotion (Russell, 2003). Building on the self-determination theory (SDT), by Ryan and Deci (2000), the core affect shows the degree to which the basic psychological needs are satisfied. The self-determination theory encompasses three basis needs that all employees have, being the need for relatedness, the need for competence and the need for autonomy (Ryan & Deci, 2000), all which can be fulfilled by the provision of job resources (e.g. Bakker, 2011; Bakker et al., 2013). The two-dimensional view of subjective well-being as applied to the work environment by Bakker et al. (2011) is shown in Figure 2.1.

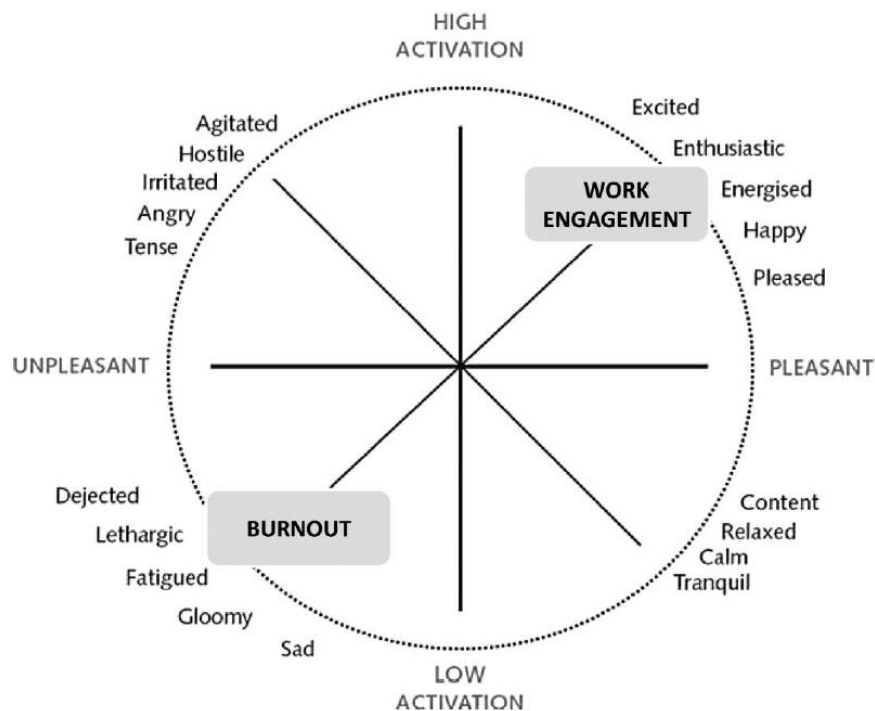


Figure 2.1: A two-dimensional view of subjective well-being (Bakker et al., 2011; see also Russell, 2003)

Based on this model, Bakker et al. (2011) argue that “(...) *emotions are not discrete and isolated entities but instead are interrelated based on the two neurophysiological systems of pleasure and activation*” (p. 76). Within this continuum of the two dimensions, being pleasant – unpleasant and activated – deactivated, a person always has a core affect at any point in time, which can be noted as a single point in the core affect model of well-being (Russell, 2003). The centre point of the model represents a neutral core affect. Moderate and extreme core affects may become visible as the point moves ‘around’ and towards the periphery of the model by responding to both internal and external events (Russell, 2003). Russell (2003) proposed work engagement to be in the top right corner of the model, referring to a state in which employees feel both pleasant and activated whereas burnout is proposed to be in the bottom left corner, referring to a state in which employees feel both unpleasant and deactivated.

This model shows that, indeed, experiencing burnout is the exact opposite of experiencing engagement, which has also been proved by others scholars (e.g. Maslach & Leiter, 2008; Bakker et al., 2013). Maslach and Leiter (2008), for example, propose that people’s psychological relation to their jobs is a *continuum* between the negative experience of burnout and the positive experience of engagement. According to Leiter and Maslach (2005), this continuum has three interrelated dimensions, being exhaustion – energy, cynicism – involvement and inefficacy – efficacy, in which the engagement component of the burnout – engagement continuum represents the ultimate goal for any burnout intervention. As argued by Maslach (1993), the significance of this three-dimensional model (burnout – engagement continuum) is that “*it clearly places the individual strain experience within the social context of the workplace and involves the person’s conception of both self and others*” (Maslach, 1993). Moreover, the model provides a more thorough perspective about people’s relationships with their workplace, over and above such single concepts as organisational commitment, job satisfaction and job involvement (Maslach & Leiter, 2008).

2.4. Individual factors

To date, burnout research is being conducted worldwide, with the majority of the work occurring in post-industrialised nations (Maslach & Leiter, 2008; see also Maslach et al., 2001). Although researchers found similar findings across cultures, there appears to be national differences in average levels of burnout. Schaufeli and Enzmann (1998), for example, found that Europeans show lower average scores than do North Americans. However, as stated by Maslach et al. (2001), *“despite these differences in average level, the more noteworthy point is that the basic patterns of burnout are fairly similar (...)”* (p. 408). So, besides the situational and organisational factors related to burnout, scholars have acknowledged the importance to consider other characteristics, such as individual variation (e.g. personality, demographics), that may correlate to burnout as well (e.g. Pick & Leiter, 1991).

Individual factors refer to *“individual differences or personal characteristics that are relatively stable over situations and time”* (Bakker et al., 2013, p. 392). For the purpose of this research, these characteristics will be referred to as control variables. According to Maslach et al. (2001), *“people do not simply respond to the work setting; rather, they bring unique qualities to the relationship”* (p. 409). Moreover, they refer to personal characteristics which include demographic variables, personality characteristics and work-related attitudes. However, as indicated before, these relationships are not as great in size as those for the aforementioned situational and organisational factors, suggesting that *“(...) burnout is more of a social phenomenon than an individual one”* (Maslach et al., 2001, p. 409). The individual factors that are identified throughout the burnout – engagement literature, including the corresponding authors, are shown in Table 2.1 and will be elaborated into more detail.

From a demographic point of view, age is the variable that has been most consistently related to burnout. Maslach et al. (2001), for example, point out that the level of burnout among younger employees is reported to be higher than it is among those over 30 or 40 years old. They argue that age is confounded with work experience, suggesting that burnout appears to be more of a risk earlier in one’s career (Maslach et al., 2001). On the contrary, scholars have not yet found a significant correlation between the demographic variable of gender and burnout. The one small but consistent correlation between gender and burnout is that males seem to score higher on the cynicism component of burnout, whereas females appear to score higher on the exhaustion component of burnout (Maslach et al., 2001). But, scholars have found some variance in occupational characteristics which need to be taken into account. For example, the aforementioned gender finding may be explained by the fact that males predominate law enforcement occupations, whereas nursing occupations are more likely to be predominated by females. With regard to marital status, Maslach et al. (2001) found that unmarried employees are more likely to experience burnout compared with those who are married. In addition, the authors found that single employees seem to report even higher burnout levels than those who are divorced (Maslach et al., 2001). Furthermore, they argue that employees with higher levels of education seem to experience higher levels of burnout than less educated employees. Although the authors stresses that it is not clear how to interpret these findings, they indicate the possibility that *“(...) people with higher education have jobs with greater responsibilities and higher stress”* (Maslach et al., 2001, p. 410).

Table 2.1: Overview of individual control variables that may influence the burnout – engagement continuum

	#	Individual control variables ↓	References ↓	Burke & Greenglass (1989)	Pick & Leiter (1991)	Semmer (1996)	Schaufeli & Enzmann (1998)	Maslach et al. (2001)	Maslach & Leiter (2007)	Maslach & Leiter (2008)	Alarcon et al. (2009)	Halbesleben (2011)	Bakker et al. (2012b)	Bakker et al. (2013)
Demographic	1	Age		✓				✓	✓	✓				
	2	Gender		✓		✓		✓	✓	✓				
	3	Marital status		✓				✓				✓		
	4	Education		✓				✓						
Personality	5	Hardiness			✓	✓	✓	✓	✓	✓	✓	✓		✓
	6	Locus of control				✓	✓	✓	✓	✓	✓	✓		✓
	7	Coping style		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	8	Type A behaviour		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	9	Self-esteem				✓	✓	✓		✓	✓	✓		✓
Work-related	10	Expectations		✓	✓	✓	✓	✓						
	11	Job rank			✓			✓	✓	✓				
	12	Work experience (e.g. N. of employers)		✓				✓		✓				

With regard to personality characteristics, several studies have been conducted to discover which type of people are at greater risk for experiencing burnout (Maslach et al., 2001). Schaufeli and Enzmann (1998), for example, counted numerous studies that included one or more personality characteristics including the ‘Big Five Factors’, being ‘hardiness’, ‘locus of control’, ‘Type A behaviour’, ‘self-esteem’ (e.g. neuroticism) and ‘achievement motivation’ (see also Bakker et al., 2013). According to Maslach et al. (2001), people with low levels of hardiness, referring to a state of involvement, sense of control or openness to change, experience higher levels of burnout, particularly to the exhaustion dimension. In addition, burnout is reported to be higher among employees with an external locus of control than those with an internal locus control Maslach et al. (2001). In line, an active or confronting coping style is associated with less burnout. Rather it is associated with the efficacy component of engagement (Maslach et al., 2001). On the contrary, a defensive coping style is associated with greater burnout, while low self-esteem has been related to all three components of burnout. Furthermore, Maslach et al. (2001) argue that Type A behaviour (competition, time-pressured lifestyle, hostility and excessive need for control) is also associated with higher levels of burnout, particularly with the exhaustion component. According to Semmer (1996), it has been argued that *“low levels of hardiness, poor self-esteem, an external locus of control and an avoidant coping style typically constitute the profile of a stress-prone individual”* (see also Maslach et al., 2001). Similar findings were reported by Alarcon et al. (2009), who show, in their meta-analysis of the relationship between personality and burnout, that personality is, indeed, related to burnout and engagement. More specifically, they found that hardiness, or openness to experience, was positively related to personal accomplishment, or efficacy. In addition, they found that emotional (in)stability (neuroticism) appeared to be the most important predictor of the exhaustion and cynicism components of burnout, whereas extraversion (external locus of control) was the most important predictor of personal accomplishment, or efficacy (Alarcon et al., 2009; see also Bakker et al., 2013). In addition, Costa and McCrae (1992), found that extraversion is generally associated with a tendency to be optimistic.

Three well-established and widely used instruments, in terms of measuring personality traits, are the 44-item Big Five Inventory, or BFI-44 (Benet-Martínez & John, 1998; John & Srivastava, 1999), the 60-item NEO Five-Factor Inventory, or NEO-FFI (Costa & McCrae, 1992), and Goldberg's instrument comprised of 100 traits descriptive adjectives, or TDA (Goldberg, 1992) (see also Gosling et al., 2003). Rammstedt and John (2007), however, argued that the demand for super-short measures is rapidly growing. Accordingly, they provided a measure of the Big Five for contexts in which participants' time was severely limited, by abbreviating the Big Five Inventory (BFI-44) to a 10-item version, the BFI-10 (Rammstedt and John, 2007). Their study showed that, although reducing the items of the BFI-44 significantly, the BFI-10 scales captured 70 percent of the BFI-44 variance and retained significant levels of reliability and validity, hence are sufficient for research settings with limited time constraints (Rammstedt and John, 2007). The BFI-10 includes five items representing the Big Five personality traits, being extraversion, agreeableness, conscientiousness, neuroticism, and openness (to new experiences).

With regard to work-related attitudes, or job attitudes, Maslach et al. (2001) point out that people have different expectations when it comes to their work. They argue that in the case of very high expectations, both in terms of the nature of work, referring to exciting, challenging and fun work, and the likelihood of achieving success (e.g. getting promoted) lead people to work too hard and too much. Thus, according to Maslach et al. (2001), high expectations may result in *"(...) exhaustion and eventual cynicism when the high effort does not yield the expected results"* (p. 411).

Similar to burnout, personality may play an important role in work engagement as well (Albrecht, 2010; Halbesleben, 2011). Halbesleben (2011) argues that *"depending on personality traits, employees may be more or less inclined to invest their resources"*. Albrecht (2010) found something similar as he argued that *"individuals with a specific personality profile may be better able to mobilise their job resources than individuals with a different profile are"*. For example, extraverts show positive emotions, frequent personal interactions and a high need for stimulation, which may be particularly helpful for mobilising support and asking for feedback (see also Bakker et al., 2013), suggesting that individual differences determine whether the objective work situation will have an impact on work engagement (Bakker et al., 2013). These characteristics are particularly associated with the involvement and efficacy components of engagement.

In addition, Bakker et al. (2012b) found a significant relationship between proactive personality and work engagement, indicating that employees with a proactive personality increase their job resources and job challenges, which in turn led to higher engagement. According to Buss (1987), these employees are *"inclined to intentionally change their circumstances, including their physical environment"* (see also Bakker et al., 2013). Thus, employees who have a tendency to change their (work) environment are most likely able to adjust their work demands and mobilise their job resources (Bakker et al., 2013). This process of employees shaping their jobs has been referred to as job crafting (Wrzesniewski & Dutton, 2001).

2.5. Measurement instruments

Several instruments can be used to measure and assess burnout and work engagement. Research on burnout uses the 'Maslach Burnout Inventory' (MBI) to assess the three dimensions, being exhaustion, cynicism and inefficacy (Maslach & Jackson, 1981a; Maslach et al., 1996). According to Maslach et al. (1996), *"the MBI is the most widely used measure of choice for any self-reported assessment of this syndrome"* (p. 214). According to Maslach et al. (2001), the MBI is the only measure that assesses all three of the core dimensions of burnout. Accordingly, three different versions of the MBI-measurement were developed. First, the MBI-Human Services Survey (MBI-HSS) was designed to identify burnout symptoms for people working in the human service industry and health care (Maslach

et al., 2001). The second version was designed for people working in educational office settings and was known as the MBI-Educators Survey, or MBI-ES. Both versions were designed to assess workers that interacted intensively with other people (clients, patients, students, etc.). However, other researchers rejected the idea that burnout is exclusively found in the human service industry and adopted the first conceptualisations of burnout to make it operational for workers in various industries (Bakker et al., 2013). This conceptualisation has led to the third version of the MBI, called the MBI-General Survey, or MBI-GS (Maslach et al., 1996; see also Maslach et al., 2001; Maslach & Leiter, 2008). The MBI-GS measures all three dimensions of the burnout – engagement continuum, being exhaustion – energy, cynicism – involvement and inefficacy – efficacy (Maslach & Leiter, 2008). Within this measurement, burnout is reflected in higher scores on exhaustion and cynicism and lower scores on efficacy, whereas the opposite pattern reflects greater engagement (Maslach & Leiter, 2008). Building on the original MBI, designed by Maslach and Jackson (1981a), the MBI-GS is a 16-item measure that assesses the burnout – engagement continuum among people in all occupations, rather than just the (human) services industries and, thus, is appropriate for employees within all types of organisations (Maslach & Leiter, 2008).

Research on work engagement uses the Utrecht Work Engagement Scale (UWES) to assess the three dimensions, being vigour, dedication and absorption (Schaufeli & Bakker, 2003; Schaufeli et al., 2002). The UWES measurement has been validated in countries across the globe (e.g. China, Finland, South Africa, The Netherlands, etc.). The confirmatory factor analysis applied to assess the three-factor structure of the UWES confirmed that it was superior to any other alternative factor structures (Bakker & Demerouti, 2008). Originally, the UWES included 24 items of which the vigour and dedication dimension consisted of positively rephrased MBI-items for a large part (Schaufeli & Bakker, 2004). Accordingly, these reformulated MBI-items were supplemented by original vigour and dedication items, as well as with items of the new absorption subscale to create the UWES-24. However, evaluations have shown that 7 items of the UWES-24 are unreliable, which were therefore eliminated resulting in the new UWES-17. In order to shorten the scales of the UWES even further, each sample was analysed separately. To date, this process resulted in the UWES-9 measurement which is mostly used in contemporary work engagement research (Schaufeli & Bakker, 2004). Schaufeli et al. (2006) provided evidence that the three engagement subscales of the UWES-9 are interrelated and can therefore also be combined into one total score.

An alternative measurement to assess work engagement is the Oldenburg Burnout Inventory (OLBI). The OLBI originally has been designed to assess burnout but includes both positively and negatively phrased items, and hence, can be used to assess work engagement as well (González-Romá et al., 2006). In contrast to the other instruments, the OLBI includes two dimensions, one ranging from exhaustion to vigour and a second ranging from cynicism to dedication. Accordingly, researchers interested in the assessment of work engagement by using the OLBI can recode the negatively framed items (Bakker & Demerouti, 2008).

2.6. Conclusions

Over the years, it has become clear that burnout was a very slippery concept as people used the term referring to different meanings. A basis for constructive communication about the problem and its solutions, therefore, was absent. Researchers, then, rejected the idea that burnout is exclusively found in the human service industry and adopted the first conceptualisations of burnout to make it applicable to for workers in various industries. This has led to the three-dimensional construct of burnout, which is still used in contemporary research. The three components of burnout are exhaustion (individual strain), cynicism (interpersonal strain), and inefficacy (self-evaluation strain). Similar to burnout, engagement is a three-dimensional construct with the components being energy

(individual strain), involvement (interpersonal strain), and efficacy (self-evaluation strain), the direct opposites of the burnout components (Table 2.2). Researchers, then, proposed that people's relationship with their jobs can be placed on a continuum between the negative experience of burnout and the positive experience of engagement, in which the burnout and engagement dimensions are interrelated. According to the continuum, in the case of burnout, energy turns into exhaustion, involvement into cynicism, and efficacy into ineffectiveness (or inefficacy). Within this continuum, the engagement component represents a desired goal for any intervention. Nevertheless, the continuum does not make any assumptions towards a prior state of mind. Moreover, when people become burned-out, this does not necessarily mean that they were previously engaged.

Table 2.2: Overview burnout – engagement continuum components

Burnout – engagement continuum	Burnout	Engagement
Individual strain dimension	Exhaustion	Energy
Interpersonal strain dimension	Cynicism	Involvement
Self-evaluation strain dimension	Inefficacy	Efficacy

This chapter therefore, attempted to elaborate each of the components of the continuum in order to give a clear overview of the constructs that act as input for the following chapters. This has been done by, not only, elaborating the constructs of burnout and engagement, but also control variables, being demographic variables, personality characteristics and work-related attitudes. One of the most influential models (i.e. the JD-R model) suggest that burnout is influenced mostly by (high) job demands, whereas job resources are found to be the most important predictors of work engagement. In line, two typical profiles eroded; a typical burnout profile with high scores on exhaustion and cynicism and low scores on efficacy versus a typical engagement profile with low scores on exhaustion and cynicism and high scores on efficacy. In addition, it was found that a 'mismatched' or burnout profile, according to Maslach and Leiter's (1997) conceptualisation of the six domains of the work environment, would include excessive workload, feelings of insufficient authority and control, lack of recognition and reward, a chronic distant work community, unfairness, and conflicting and monotonous work, whereas a 'matched' or engaged profile would include a sustainable workload, feelings of choice and control, appropriate recognition and reward, a supportive work community, fairness and justice, and meaningful and valued work. Additionally, it has become clear that burnout is mainly being measured using the Maslach Burnout Inventory (MBI), whereas engagement is being measured using the Utrecht Work Engagement Scale (UWES).

Based on these principles, it can be concluded that the burnout – engagement continuum can be characterised by three main dimensions, being exhaustion – energy, cynicism – involvement, and inefficacy – efficacy as can be seen in Figure 2.2, whereas a clear overview of the variables that have been found to be correlated to each individual dimension can be found in Appendix A. Moreover, the control variables are divided into individual factors and situational factors. Accordingly, the individual control variables are composed by demographic variables, personality variables and work-related attitudes, whereas the situational factors are composed by the six domains of work-life.

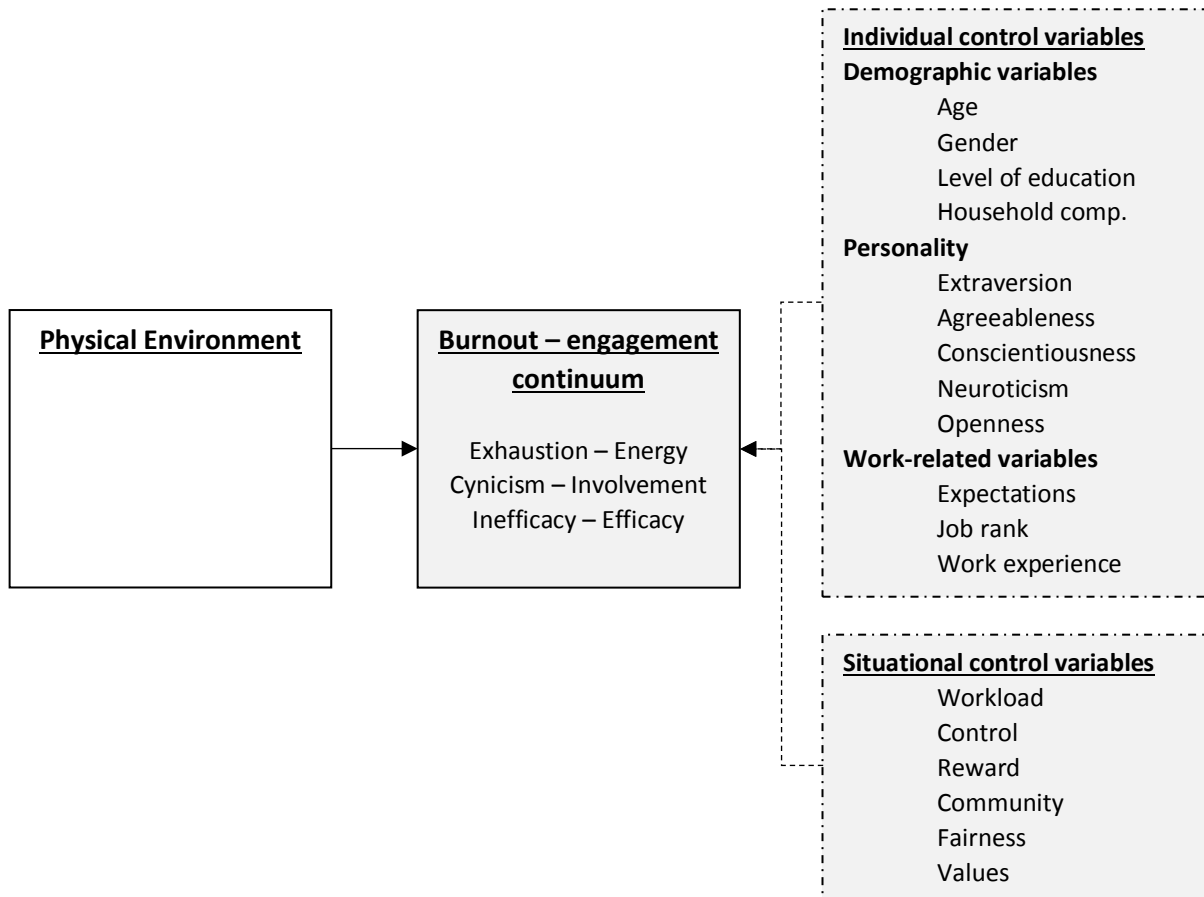


Figure 2.2: Conceptual model – elaboration of the burnout – engagement continuum components

3. Activity based office environment

This chapter focusses on the physical environment, especially on the activity based office concept. As mentioned in Chapter 1, an activity based office includes various types of workspaces from which employees can choose, based on their current activity. First, the physical work environment will be elaborated. Next, the role of the physical work environment within an organisation will be discussed. Both research domains have had a significant impact on the development of the activity based office. Particularly the latter is important for this research, as it is attempted to give advice to (corporate real estate) managers regarding the required workspaces within an organisation. Secondly, the development of office innovation will be explained as it is argued that office innovation, with its unique characteristics, forms the base for the activity based office concepts. Next, the concept of the activity based offices will be elaborated, and it is attempted to find the unique characteristics that are related to the burnout – engagement continuum. This chapter ends with a conclusion and an answer to the second sub question: What is the physical work environment and which different characteristics can be distinguished for an activity based work environment?

3.1. Physical work environment

In recent years, there has been a fundamental shift in the nature of work from that of an industrial economy to one based on service and knowledge (e.g. Haynes, 2007a; Baarne et al., 2010; Blok et al., 2012). According to Kirsten (2010), among others, employees throughout the knowledge-intensive and service industries are facing immense challenges as they increasingly have to deal with fast-paced business environments and growing demands for increased productivity. Academics have increasingly tried to link various concepts of the physical work environment to the level of (perceived) productivity and performance of office workers and previous research, indeed, has found significant positive relationships (e.g. Van der Voordt, 2004; Haynes, 2007a; Appel-Meulenbroek et al., 2011; De Been and Beijer, 2014). However, neutral effects have been reported as well. Hoendervanger et al. (2015), for example, argue that there is hardly any evidence for the presumed effectiveness of work environment concepts regarding job performance, and neither for employee satisfaction, health and well-being.

The contradicting findings regarding the successes and failures of office work have created tensions in office designs (e.g. Haynes, 2007a). Moreover, the growing number of knowledge workers has made it increasingly important to establish the role of the physical environment towards the performance of its occupiers. Accordingly, Van Ree (2002) states that the design of an office accommodation should be seen as a resource that could impact the performance of an organisation as a whole, thereby stimulating engagement among employees. These contradictive findings indicates the importance of finding solutions to optimise the physical environment in a way that it facilitates work performance and supports the employee needs for well-being to the best of its ability.

Since job resources play a buffering role in the relationship between job demands and burnout (Bakker et al., 2005a), organisations have to facilitate work environments that stimulate job resources, and reduce job demands to a minimum. But evidently, certain elements of the physical work environment itself can also be seen as a resource.

It has increasingly become important to create office environments that support and engage employees in the way they work by acting as enablers of work processes, rather than disablers. Notably, Leesman (2017) identified three types of workplaces and distinguished them in terms of their *supporting ability* or *supportiveness*. Employees in a ‘catalyst workplace’ are supported by workplace characteristics that energise their daily contribution. In terms of the burnout – engagement

continuum, catalyst workplaces may be associated positively with the energy component of engagement. Opposite to the catalyst workplace is the 'obstructive workplace', in which daily routines are blocked by workplace characteristics that do not support the employee needs at all. In terms of the burnout – engagement continuum, obstructive workplaces may be associated positively with the exhaustion component of burnout. In between the catalyst workplace and the obstructive workplace rests a wide range of 'enabler workplaces' that neither actively support, nor overly obstruct employee needs. According to Leesman (2017), the key goal is getting a better understanding of how the *catalyst* workplaces perform, as those workplaces "*elevate themselves way above questions of fitness for purpose and make a proactive contribution to business effectiveness*" (Leesman, 2017, p. 3). As a result, organisations are required to focus on the employee needs for well-being in order to be able to, not only, support their satisfaction, health and productivity (Krumm & Vries, 2003; Rothe et al., 2012) but also develop a competitive advantage by attracting and retaining talented employees (Earle, 2003; Bakker and Leiter, 2010). More specifically, organisations should stimulate engagement by providing supporting, involving, and challenging workplace environments.

In order to understand the components of the office environment and their relative impact on the occupiers, Haynes (2007a) proposed a theoretical framework in which the office environment consists of two dimensions: the physical environment and the behavioural environment. Based on previous research, it could be argued that the physical environment is defined by components such as the office layout, designated areas, office comfort and environmental services (Whitley et al., 1996; Oseland, 1999, 2004; Leaman & Bordass, 2000), whereas the behavioural environment is defined by the dynamic elements of the office environment, with interaction among co-workers and perceived distraction during work as its most vital components. More specifically, Haynes (2007a) argued that these components are a collective of different attributes. The 'office layout' and 'designated areas' components (in short: 'office layout') of the physical environment, for example, can be defined by attributes such as (in)formal meeting areas, quiet areas, private areas, personal and general storage and work areas. In terms of the burnout – engagement continuum, especially the situational variables (see also Section 2.1.1. or Figure 3.1), office layout may be linked to perceived feelings of control and community, thereby being closely related to all three dimensions of the burnout - engagement continuum (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). In line, the availability of a diversity of workplaces may be perceived as a presence of job resources, suggesting a positive link to work engagement. The most profound benefits of having a diverse range of workplaces is that it may increase the perceived levels of privacy and autonomy, since employees can choose a workplace that suits the corresponding activity best. These factors are associated with respectively lower levels of exhaustion (privacy) and higher levels of efficacy (autonomy) (e.g. Maslach et al., 2001; Maslach & Leiter, 2008).

The 'comfort' and 'environmental services' components (in short: 'comfort') can be defined by ambient factors such as ventilation, heating, natural- and artificial lighting and more general attributes such as security, cleanliness and overall comfort. Comfort may be linked to perceived feelings of control, fairness and values (e.g. equal treatment regardless of job rank), thereby closely related to all three dimensions of the burnout – engagement continuum (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). In line with this, the presence of ambient services is perceived as a presence of job resources, suggesting a positive link to work engagement as well. For instance, the ability to control or adjust ambient factors such as (artificial) lighting, ventilation or heating to the individual preferences increases the sense of autonomy (e.g. Maslach et al., 2001; Maslach & Leiter, 2008).

The same mechanism is used for the behavioural environment as it is argued by Haynes (2007a; 2007b) that the 'interaction' component can be defined by attributes such as social- and work interaction, atmosphere and overall office layout. In terms of the burnout – engagement continuum, especially the situational variables (see also Section 2.1.1. or Figure 3.1), the interaction component

may be linked to perceived feelings of community, thereby closely related to the individual strain of exhaustion or energy, the interpersonal strain of cynicism or involvement, and the self-evaluation strain of inefficacy or efficacy (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). Some attributes of the interaction component may be perceived as a presence of job demands, indicating a possible link to burnout. For instance, (obligatory) meetings result in the necessity to switch (current) tasks. According to Rubinstein et al. (2001), for example, task switching results in a delay before engaging effectively in a new task, hence reduced productivity. In addition, meetings generally lead to unanticipated tasks, suggesting an increase in workload (e.g. Thomas et al., 2006).

Finally, the ‘distraction’ component can be defined by attributes such as interruptions, perceived feeling of crowding and noise. The distraction component may be linked to perceived feelings of control, thereby being closely related to all three dimensions of the burnout – engagement continuum (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). But, although the distraction attributes do not precisely fit the ‘requirements’ in order to be either perceived as job demands or job resources, they are more of a predictor of burnout than a predictor of engagement. For the in-depth relationships between the theoretical framework proposed by Haynes (2007) and the situational variables references are made to Chapter 2, while an overview of the relationships between the situational variables and the dimensions of the burnout – engagement continuum can be found in Appendix A.

An overview of the components and attributes proposed by Haynes (2007) can be found in Table 3.1, in which it becomes clear that the proposed attributes possibly affect all three dimensions of the burnout – engagement continuum, rather than single dimensions. This appears to be valid, taking into account that the dimensions of the burnout – engagement continuum are interrelated too. For instance, depersonalisation (cynicism), or distancing is such an immediate reaction to exhaustion that a strong relationship from exhaustion to depersonalisation is found consistently throughout burnout research (Maslach et al., 2001; see also Maslach & Leiter, 2005; 2008). However, Haynes (2007) points out that, despite various studies in this field, no consensus has been found on the aspects of the office environment that stimulate employee satisfaction and organisational performance with the exception of the fact that the behavioural environment (interaction, distraction) and the physical environment (office layout, comfort) are intertwined and cannot be seen separately from each other (Haynes, 2007). More specifically, he argued that the physical layout of office environments is interrelated with the work patterns and organisational culture of the company (Haynes, 2007). So, in order to understand the physical environment, it is important to acknowledge the relationship with the behavioural environment.

Table 3.1: Overview of proposed components and attributes of the physical environment (based on Haynes, 2007a)

Factor	Component	Strain (BEC)	Attribute
1	Office layout	Individual Interpersonal Self-evaluation	Informal meeting areas, formal meeting areas, quiet areas, private areas, personal storage, general storage, work area – desk circulation space
2	Comfort	Individual Interpersonal Self-evaluation	Ventilation, heating, natural lighting, artificial lighting, décor, cleanliness, overall comfort, physical security
3	Interaction	Individual Interpersonal Self-evaluation	Social interaction, work interaction, creative physical environment, overall atmosphere, position relative to equipment and overall office layout
4	Distraction	Individual Interpersonal Self-evaluation	Interruptions, crowding, noise

3.2. Office innovation

In the early 1990's, organisations began to experiment with flexible workplaces, thereby replacing the traditional cellular and open-plan offices (e.g. Van der Voordt, 2004; Pullen & Bradley, 2004; Meijer et al., 2009). According to Van der Voordt (2004), *"economic considerations (e.g. low occupancy of expensive workplaces), organisational developments (network organisations, teamwork, fast exchange of knowledge, part-time work) and external developments (globalisation, strong competition) are important drivers for change"* (p. 133). The idea was that innovative offices, based on concepts such as new ways of working or activity based working, *"should lead to more efficient use of space and other facilities, greater job satisfaction, the projection of a positive image to clients, an improved performance of the organisation and its staff, and reduced costs"* (Vos & Van der Voordt, 2001, p. 48). Most importantly, innovative offices had to improve the productivity and cost savings without reducing employee satisfaction.

The introduction of more advanced information and communication technologies (ICT) increasingly made work independent of place and time. In order to develop a competitive advantage by attracting and retaining talented employees, organisations increasingly steered on autonomy, trust and responsibility as important work benefits (e.g. Vos & Van der Voordt, 2001). Office workers, on the other hand, seemed to be increasingly seeking for *"an interesting, exciting and creative existence, where work and private-life fit well with each other"* (Vos & Van der Voordt, 2001, p. 49). In other words, organisations attempted to create a synergetic balance between the employees' needs for well-being and the company's goal for profitability. These developments, however, made great demands on the work environment. According to Vos & Van der Voordt (2001), organisations attempted to achieve this balance by making adjustments to their physical work environment, while optimizing the efficiency of the available workspace.

This alignment of accommodation, ICT and other facilities to changing work processes is sometimes called workspace innovation or office innovation (Van der Voordt & Vos, 1999; see also Vos & Van der Voordt, 2001) and can be very profitable for organisations since the cost of office accommodation is often the second largest expense, besides labour cost (Oladokun, 2010; Pole & Mackay, 2009). As argued by Vos and Van der Voordt (2001), *"the focal point is the question of the optimal match between accommodation and facilities on the one hand, and organisations and work processes on the other, and this in interaction with an environment in which all sorts of societal, economic and technological developments are taking place"* (p. 49). Evidently, implementations of office innovation can vary considerably, but according to Vos and Van der Voordt (2001) many elements are very similar and include, among others:

- *Rebuilding a cellular office environment or an open-plan office as a combi-office;*
- *Introducing 'flexi-working' with shared workplace, interchangeable workplaces and activity-related workplaces;*
- *Attractively designed and ergonomically responsible furniture;*
- *Advanced information and communication technology (ICT);*
- *A different filing system (central, digital), and;*
- *Distance working (or teleworking).*

According to Vos et al. (1999), these changes can be divided into three main categories, being 'changes in layout', 'changes in workplace use', and 'changes in location'. This is acknowledged by De Croon et al. (2005), who argue that conventional and innovative offices can be described according to three dimensions, being the 'office layout' (e.g. open layout vs. cellular layout), 'office use' (e.g. fixed

workplaces vs. shared workplaces), and 'office location' (telework vs. conventional office). When it comes to office innovation, expectations are high. According to Van der Voordt (2004), for example, expectations generally consist of:

- *Increased effectiveness (e.g. higher productivity);*
- *Increased pleasure at work (e.g. greater employee satisfaction);*
- *Positive image of the organisation;*
- *Attraction and retention of talented employees and clients;*
- *Increased flexibility, and;*
- *Cost savings.*

He argues that *"by sharing different types of workplaces, each geared towards different kinds of activities, and the availability of advanced information and communication technology, ergonomic furniture and digital team archives, this will lead to a more efficient use of space and other facilities (input) and a better performance of the organisation and its employees (output)"* (Van der Voordt, 2004, p. 134). Moreover, Van der Voordt believes that diversity of office types, availability of high-quality ICT-services and facilities and functional ergonomics are four of the most important ingredients of an innovative office environment, thereby increasing the efficiency and productivity of organisations. This is acknowledged by Meijers et al. (2009), who have studied the effects of office innovation on office workers' health and performance and found a significant increase in general health and perceived productivity.

New ways of working

In terms of operationalising office innovation, various office concepts have been developed over the years in an attempt to make optimal use of the available space and empower knowledge workers to work more efficiently and effectively (Blok et al., 2012). One such development is called 'new ways of working', which implies offering employees more autonomy and freedom by introducing flexible work arrangements (Blok et al., 2012), referring to perceived feelings of control over workplace hazards (e.g. ambient factors) and, thereby, stimulating engagement. Accordingly, they argue that implementing new ways of working requires changes that take place at four aspects, being the physical environment, information and communication technology (ICT), organisation and management, and the work culture (Blok et al., 2012). Subsequently, a significant change in work behaviour can only be achieved if all four aspects of new ways of working are implemented adequately (Blok et al., 2012).

Similarly, Laihonon et al., (2012) label new ways of working by referring to *"non-traditional work practises, settings and locations with information and communication technologies (ICT) to complement or replace traditional ways of working"*. For organisations, this means *"a growing global business opportunity in providing services to organisations that are transforming their workplaces into flexible, adaptable and collaborative learning environments"* (Aaltonen et al, 2012, p. 17). Throughout research, this complex concept has been described using three key components: the 'physical space' required for productive knowledge work and meeting, the 'virtual space' for knowledge sharing and the 'social space' required to learn to use both the physical and digital places (Aaltonen et al., 2012; Van Koetsveld & Kamperman, 2011; Ross, 2010). Subsequently, these components are divided into six underlying categories, which are the focus points of new ways of working. An overview of this new ways of working environment can be found in Figure 3.1.

In contrast to Haynes (2007a), Aaltonen et al. (2012) describe the physical environment as a built, tangible environment made for different purposes and different uses. When these spaces are in use, they are places that can be classified in many ways. More specifically, the physical environment

is any workplace and all its physical aspects within that building. The location component is no longer leading. Instead, it is the quality of the workplace that matters (Aaltonen et al., 2012). Consequently, the virtual space refers to the electronic working environment. For example, the internet provides a platform for simple communication and more complex tools (Vartiainen et al., 2007). The combination of the physical and virtual workspace can be described as a ‘workscape’, which refers to the layers where we work; *“the constellation of real and virtual work settings (such as furniture and IT), within particular spaces (such as meeting rooms, project areas and cafés), which are located on a specific environment (such as office building, city district, home, airport)”* (Vartiainen et al., 2007). The social space refers to the social context and the whole social network where work takes place.

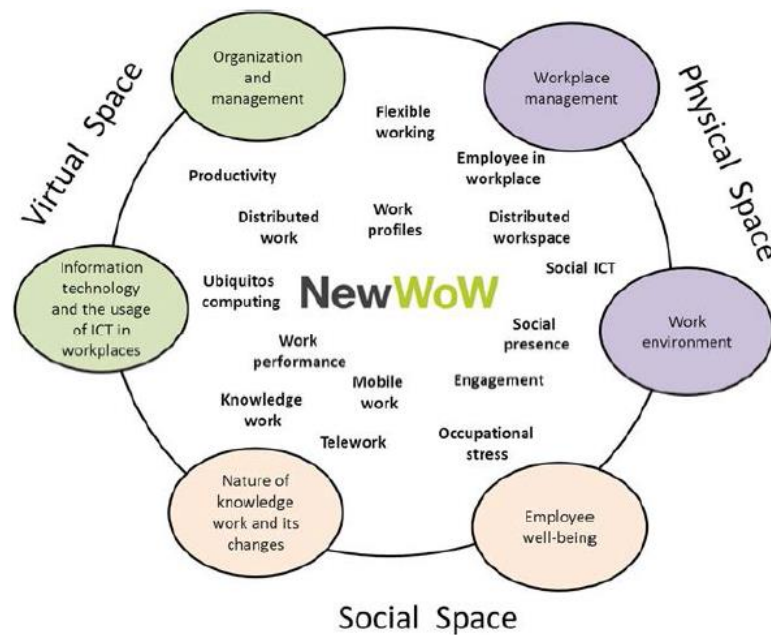


Figure 3.1: The complex environment of new ways of working (Aaltonen et al., 2012)

Implementing new ways of working comes with both positive and negative effects. It has been argued that implementing new ways of working empowers employees to work more efficiently and effectively as they are offered more autonomy and freedom (Blok et al., 2012). Besides, Bijl (2009), for example, argues that introducing new ways of working grants the organisation with (among others) increased revenues, employee satisfaction and sustainability, while other authors primarily stress the achieved increase in organisational productivity and performance (e.g. Van der Voordt, 2004; De Been & Beijer, 2014). According to Engelen et al. (2019), it provides opportunities for communication, collaboration and interaction. On the other hand, implementing new ways of working may decrease social cohesion and interaction among co-workers, referring to lacking feelings of perceived community, thereby potentially stimulating burnout. This has been acknowledged by Gorgievski et al. (2010), who reported complaints regarding the physical availability of co-workers and other staff members. More specifically, they argued that because of hot-desking, staff members lack a place of their own, while people no longer permanently work at the office (Gorgievski et al., 2010). Ursin and Eriksen (2004), in addition, stressed that *“by implementing an innovative office concept, a new situation arises, which itself is known to be considered a main stressor”*. Other complaints that have been reported in the literature are, among others, lack of privacy and concentration, loss of storage space, and loss of both personal and group identity, by not being able to personalise the workspace (e.g. Gorgievski et al., 2010).

Recapitulation

In conclusion, it has become clear that office innovation, in general, requires three key characteristics (Baarne et al., 2010), being *place* referring to the autonomy of employees in deciding where to work, *timing* or flexibility referring to the autonomy of employees in deciding when to work, and *information and communication technologies*, referring to various options for communication with co-workers and other staff members (Baarne et al., 2010). According to Demerouti et al. (2014), all three characteristics have to be present to meet the criteria of new ways of working.

However, if the focal point is zoomed in at the physical environment, it has become clear that the construct of the physical environment is not entirely unambiguous, neither is the definition of the term. Aaltonen et al. (2012) define the physical environment as a built, tangible environment made for different purposes and different uses, underlining the ambiguity of the term. More specifically, the physical environment is often described using its components. For example, Haynes (2007a) distinguished that the physical environment consists of the office layout, designated areas, office comfort and environmental services. In line, Appel-Meulenbroek et al. (2011) used similar terms to describe the physical environment, including office comfort, control of indoor climate, relative location of the workstation, (perceived) privacy, quality of IT hardware, ambiance and the use of colours and materials. In addition they found that the ergonomics and dimensions of work desks are important components of the physical environment (Appel-Meulenbroek et al., 2011), while Appel-Meulenbroek et al. (2015) also include facilities as one of the key principles of the physical environment. Moreover, it has become clear that the physical environment can be translated into several main aspects, being the office layout, office use, office location (e.g. Van der Voordt, 2004; De Croon et al., 2005; Demerouti et al., 2014), office comfort (e.g. Appel-Meulenbroek et al., 2011; Aaltonen et al., 2012) and information and communication technology (e.g. Van der Voordt, 2004; Baarne et al., 2010; Aaltonen et al., 2012).

3.3. The activity based office

For efficiency reasons, new ways of working is often being implemented by using activity based office designs. While the terms are related, it is important to understand that they are very distinct and not to be confused. Whereas new ways of working refers to the idea of a new work environment, the activity based office is the most advanced physical translation of this environment. As stated by Ross (2010), *“rather than save space by making people share desks, activity based working takes an alternative approach that has its foundations in the three pillars of people, place and technology”* (p. 12), referring to the social-, physical- and virtual space described by Aaltonen et al. (2012). However, the foundation of both terms is equal and lies in the optimisation of the alignment between the work environment (office layout) and the employee work patterns.

The so-called activity based workplace is a product of office innovation which was originally introduced to support the productivity of present-day knowledge workers who mostly populate offices (Appel-Meulenbroek et al., 2011). As emphasised by Worthington (1997), the foundation of this concept came into being during the 1980's with the Communication and Concentrations office or 'CoCon-office'. Within these offices, employees could use a number of different types of office settings for different types of activities. The low occupancy rates of these office types during the 1990's, however, has led to the idea of sharing workplaces. The introduction of more advanced information and communication technologies increasingly made work independent of place and time. Employees therefore, could change to a preferred workstation several times a day, according to their activity. More specifically, whilst at work employees are able to choose an activity based workstation that best suits the activity at hand from a functional perspective and also matches with the employees' preferences (Appel-Meulenbroek et al., 2011).

Activity based working is supported by work environments that combine hot-desking with a variety of workplaces, designed to support different types of activities (Hoendervanger et al., 2015) and is supposed to grant the organisation cost reduction through workplace sharing (Gorgievski et al., 2010). In addition, Veldhoen (2008) argues that activity based working refers to the idea that *“people can work flexibly, using different types of workplaces, designed to support different types of activities”*. Moreover, within an activity based work environment, people do not have assigned workplaces, but can use available workplaces on a need basis. The number of users therefore, exceeds the number of workplaces, because they can work time and place independent. The office has just become one of a number of locations in which work can take place. In line, Ross (2010) predicts the rise of new destinations and locations for work, the so-called third places which he labelled as *“places in between the home and the corporate centre”* (Ross, 2010, p. 5). These third places provide an effective place for people to work on the pause and are not owned or leased by an employing company but shared by people and used on a need basis. This phenomenon has become known as ‘geopresence’ (Ross, 2010).

As the activity based working concept is argued to offer both efficiency and effectiveness, the growing popularity of activity based work environments among organisations is understandable. As mentioned by Hoendervanger et al. (2015), efficiency gains seem obvious because less workplaces, square meters and associated costs are needed to facilitate the workforce in comparison to concepts that are based on assigned workplace which are under-utilised in many cases. This is acknowledged by Ross (2010) who states that *“the majority of desks, typically more than 55%, in an average office are empty at any one point in time”* (p. 4). As work becomes a more collaborative activity, people increasingly spend time working with others. Besides efficiency and effectiveness, these concepts have the potential to support organisations with other advantages including increased productivity, reduced costs, increased flexibility, strengthened organisational image and improved collaboration (e.g. Van Koetsveld & Kamperman, 2011). By taking these aspects into account, it is not surprisingly that the activity based office is rapidly being introduced worldwide (Dixon & Ross, 2011).

However, negative effects have been monitored as well. Wrongful estimations of the required number and type of workplaces, for example, have led to environments that did not support the new work processes optimally and were therefore counterproductive (Brennan et al., 2002; Duffy & Tanis, 1993). As mentioned by Rashid and Zimring (2008) and Vischer (2007), such a misfit between the user and the environment can create workplace stress and negatively influence productivity.

In order to give structure to the characteristics of influence within an activity based office environment, the activity based office environment has been divided into six main aspects based on the literature. More specifically, Vos et al. (1999) and De Croon et al. (2005), in their research on office concepts, divided the physical work environment into office layout, office use and office location. This will be extended with office comfort (e.g. Bluysen et al., 2010), facilities (e.g. Appel-Meulenbroek et al., 2011, 2016) and information and communication technology (e.g. Aaltonen et al., 2012). In addition, knowledge worker activities will be added to this research (e.g. Leesman, 2017). The characteristics and attributes that are identified throughout the literature (source ≥ 2000), including the corresponding authors, are shown in Table 3.2 and Appendix B. Each of the following sections will elaborate on the specific characteristics and attributes of the associated aspect that may influence the activity based office environment from a burnout – engagement point of view. Similar to the other chapters, this chapter will end with an overview of the assumed characteristics of activity based office environments that may be related to the burnout – engagement continuum.

Table 3.2: Overview of characteristics and attributes that may influence the ABO from a burnout – engagement continuum point of view

	↓ ABW characteristics	Activities	Office Layout					Office Comfort			ICT		Office Use				Office location	
		1 Variety of workspaces (e.g. office types)	2 Availability of workspaces (e.g. # workspaces)	3 Proximity of workspaces	4 Overhearing (distance)	5 Facilities (e.g. printers, storage)	6 Ambient factors (e.g. heating, ventilation)	7 Ergonomics (e.g. office furniture)	8 Noise (e.g. sound level)	9 Privacy (e.g. auditory, visual)	Overall comfort	10 ICT-services (e.g. mobile tools)	Overall communication	11 Desk-sharing (e.g. claiming behaviour)	12 Desk-switching (e.g. switching behaviour)	13 Overall interaction (e.g. social-/work related)	14 Overall distraction (e.g. interruptions, crowding)	15 Telework
References ↓	#																	
Leesman (2017)	✓	✓			✓	✓	✓	✓	✓			✓			✓		✓	
Appel-Meulenbroek et al. (2016)					✓	✓			✓			✓			✓		✓	
De Been et al. (2016)		✓					✓	✓	✓							✓		
Hoedervanger et al. (2015)	✓	✓	✓															✓
Appel-Meulenbroek et al. (2015)	✓	✓	✓			✓							✓					
Demerouti et al. (2014)	✓								✓	✓	✓	✓			✓	✓	✓	✓
Feige et al. (2013)	✓						✓			✓	✓	✓				✓	✓	
Aaltonen et al. (2012)	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Appel-Meulenbroek et al. (2011)	✓				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			
Van Koetsveld & Kamperman (2011)	✓													✓				
Leaman & Bordass (2010)	✓			✓			✓			✓		✓				✓		
Bluyssen et al. (2010)							✓	✓	✓	✓	✓							
Miller & Pogue (2009)	✓		✓				✓		✓	✓	✓							
Bodin-Danielsson & Bodin (2008, 2009)	✓	✓	✓				✓		✓									
Veldhoen (2008)	✓																	✓
Vischer (2007, 2008a, 2008b)	✓					✓	✓	✓	✓	✓					✓	✓	✓	
Haynes (2007, 2008)		✓	✓	✓			✓		✓	✓					✓	✓	✓	
De Croon et al. (2005)		✓	✓	✓		✓		✓			✓	✓	✓	✓				✓
van der Voordt (2004)	✓	✓	✓			✓		✓			✓		✓	✓				
Heerwagen et al. (2004)												✓			✓			
Roelofsen (2002)	✓					✓	✓	✓	✓	✓								
Brill et al. (2001)	✓	✓		✓			✓	✓	✓	✓		✓		✓	✓	✓	✓	
Vos & van der Voordt (2001)	✓					✓					✓							
Evans & Johnson (2000)						✓		✓		✓					✓	✓		

3.3.1. Knowledge worker activities

Numerous studies have emphasised the importance of activities conducted in activity based offices (e.g. Veldhoen, 2008; Van Koetsveld & Kamperman, 2011; Hoendervanger et al., 2015). As the name implies, activity based working refers to the idea that *“people can work flexibly, using different types of workplaces, designed to support different types of activities”* (Veldhoen, 2008; see also Hoendervanger et al., 2015). The activity based workplace was originally introduced to support the productivity of present-day knowledge workers who mostly populate offices (Appel-Meulenbroek et al., 2011). Since knowledge workers generally conduct different activities than other types of employees do, this section introduces a wide range of different knowledge worker activities.

According to Van Koetsveld and Kamperman (2011), activity based working *“is built on the assumption that the activity determines which facility you need, which will make you change work settings during the day”*. Evidently, within service organisations, several types of activities can be distinguished (Tabak, 2009; Vos & Van der Voordt, 2001). Tabak (2009), for example, recognised three aspect on which the knowledge workers activities can be categorised (see also van Susante, 2015):

- Social, physiological and/or job related activities (referring to the relationship with work);
- Individual or group activities (referring to the number of participants), and;
- Planned or unplanned activities (referring to the degree of planning involved).

In addition, Appel-Meulenbroek et al. (2011) studied four different organisations with activity based work environments to evaluate the effectiveness of their activity based office and found a more specific set of activities conducted by the participants. Accordingly, they constructed a taxonomy of activities using the three aspects recognised by Tabak (2009), and found that employees can be ‘absent’, ‘absent but [desk is] visibly in use’, ‘behind the computer’, ‘reading or writing’, ‘on the phone’, ‘paper handling’, ‘having informal talks’, ‘formal work consulting’, and ‘pausing at the workplace’.

Appel-Meulenbroek et al. (2015) used a different approach, arguing that the activities can differ based on the level of concentration needed to conduct the activity and whether they are formal or informal of nature. Based on these studies, the following activities can be observed: ‘informal meeting’, ‘formal meeting’, ‘work related activity’ (reading, writing, typing, etc.), ‘telephone/video’ and ‘informal activity’ (coffee/copying). In addition they argue that a facility might also ‘not be in use’ or that the ‘user might temporarily be elsewhere’.

Also, Leesman (2017) has identified activities conducted by knowledge workers in office environments. The Leesman Index has gathered information from over 250.000 employees working in corporate workplaces around the world and acquired an enormous collection of workplace effectiveness data. Leesman (2017) identified the most important activities according to the respondents of their survey in which the respondents were asked to rate 21 different work activities based on importance. An overview of the top 10 activities is shown in Table 3.3.

Table 3.3: Knowledge worker activities (Leesman, 2017)

Rank	Activity	Importance
1	Individual focused work, desk based	92.8%
2	Planned meetings	76.6%
3	Telephone conversations	75.1%
4	Informal, un-planned meetings	62.8%
5	Collaborating on focused work	58.2%
6	Relaxing, taking a break	52.8%
7	Reading	52.4%
8	Individual routine tasks	49.2%
9	Audio conferences	48.8%
10	Thinking, creative thinking	48.3%

Notably, much of the activities conducted within office environments are related to developing and manipulating information (e.g. desk based, meetings, conversations, reading, creative thinking), since numerous activities with high rankings (perceived importance) require interaction among co-workers and other staff members. This indicates a relationship between the activities conducted and the engagement transmitted among employees, as well as the amount of knowledge sharing. Nevertheless, both attributes (transmitting engagement and knowledge sharing) are closely related to the interpersonal strain of cynicism or involvement and the self-evaluation strain of inefficacy or efficacy (e.g. Maslach et al., 2001; Maslach & Leiter, 2008).

De Been et al. (2016) identified three main activities of knowledge workers, being 'concentrated work', 'knowledge sharing' and 'social interactions'. Each of which shows a significant amount of overlap with the activities identified by Leesman (2017). For example, (individual) focused work, reading and creative thinking show similarities with 'concentrated work'. Meetings, both planned and un-planned, collaboration and (audio/video) conferences can be referred to as 'knowledge sharing' and 'social interactions' can be related to informal and un-planned meetings, relaxing or taking a break. Consequently, the three types of activities identified by De Been et al. (2016) can be seen as a comprehensive overview of the knowledge worker activities. Getting a better understanding of the activities conducted by knowledge workers in activity based offices, allows (corporate real estate) managers, for example, to be better able to align the office environment (office layout) with the activities conducted by knowledge workers. Moreover, they may be able to maximise the interaction component whilst at same time minimising the distraction component, hence limiting the potential risk of burnout (e.g. Maslach et al., 2001; Bakker et al., 2013). In addition, it is assumed that switching activities during the day increases task variety, which in turn has been associated with the energy component of engagement (e.g. Bakker et al., 2013).

3.3.2. Office layout

According to Van der Voordt (2004) and De Croon et al. (2005), among others, one of the key aspects of the 'office layout' component is having a variety of workplaces (e.g. different office types) within a work environment (see also Section 3.2). Bodin-Danielsson and Bodin (2008), for example, examined the relationship between different office types and health, well-being and job satisfaction among employees. According to the authors, job satisfaction and health status among employees are most likely related to each other, making job satisfaction key in achieving a more motivated and better performing workforce (Bodin-Danielsson & Bodin, 2008). In line, Bodin-Danielsson and Bodin (2009), argued that *"different environmental factors have an impact on the perception and behaviour of employees in offices"* (p. 242). Both studies included various types of offices, such as cell-offices, shared-room offices, open-plan offices (small-sized, medium-sized, and large open-plan offices), flex-offices and combi-offices.

Overall, Bodin-Danielsson and Bodin (2008; 2009) found that cell-office employees are the most satisfied group of employees, followed by those in flex-offices. Both office types scored high with respect to good health and job satisfaction, whereas open-plan offices generally score low (Bodin-Danielsson & Bodin, 2008; 2009). According to them, the cell-office also stands out with regard to noise and privacy, as employees in cell-offices experienced high levels of autonomy and control over the environment on an individual basis in terms of ambient factors, as well as noise and privacy conditions (Bodin-Danielsson & Bodin, 2009) (see also Section 3.3.3.). As such, the presence of cell-offices and flex-offices, preferably both, are assumed to be positively related to engagement and especially with the individual strain of energy.

According to the authors, the self-reported health status and job satisfaction is mainly influenced by job rank and demographic variables such as age and gender (Bodin-Danielsson & Bodin, 2008; 2009). They stress that *"more personal control over the physical workspace (e.g. adjustment,*

variety of work environments available), as well as easy access to meeting places, increased job satisfaction” (Bodin-Danielsson & Bodin, 2008, p. 658). In general, these aspects are more often present in cell-offices and flex-offices than in open-plan offices. However, they are not to be replaced for open-plan offices entirely. Commonly, the work environment includes a variety of workplaces, in which a centrally located open-plan office is surrounded by other office types such as cell-offices, flex-offices, meeting areas and quiet areas (e.g. Bodin-Danielsson & Bodin, 2008; 2009).

Besides different office types, Heerwagen et al. (2004), among others, argue that organisations should stimulate (informal) interactions (e.g. knowledge sharing) between co-workers by focussing on the *spatial design* of office buildings (e.g. office layout). This is especially true when office innovation is a high priority (e.g. new ways of working, activity based working). Spatial design of office buildings has been proven to influence the number of meetings employees have at work (e.g. Coradi et al., 2015), but few studies have investigated the behaviour during such meetings. Appel-Meulenbroek et al. (2016), in their research on knowledge sharing behaviour, examined the role of spatial design in (office) buildings by collecting a 1-week interaction-diary of 138 employees working in a research organisation. Their research primarily focused on the placements of dyads, referring to *“the most elemental level of analysis for understanding networks based on information sharing, collaboration, or teamwork”* (Kabo et al., 2015, p. 58). Commonly, a dyad consists of two co-workers that interact with each other, based on their (shared) placement within the building. Of the five office layout characteristics, identified by Appel-Meulenbroek et al. (2016), sharing a room (collaboration) and overhearing showed significant results in terms of interaction that involves knowledge sharing, while close proximity (e.g. distance between workspaces) appears to be related to an awareness of each other and prompts mere interaction with each other. More specifically, Heerwagen et al. (2004), among others, suggest that sharing a room can be beneficial for collaboration, since it might be easier to ask questions or perform actions together (see also Appel-Meulenbroek et al., 2016). Proximity can be an important aspect since people working in different rooms, but within proximity of each other, still meet more often than people whose rooms are further away (e.g. Allen, 1977), while Allen and Henn (2007), for example, showed that beyond one’s own floor, interaction between co-workers declines dramatically. In addition, Peponis et al. (2007) argue that talking between co-workers (e.g. knowledge workers) and other staff members primarily takes place near the workplace, rather than in hallways (Peponis et al., 2007), indicating the importance of workplace allocation. Both factors (sharing a room and proximity) are assumed to positively contribute to knowledge sharing and social support, hence, are related to the efficacy component of engagement (e.g. Maslach et al., 2001; Bakker et al., 2013; see also Section 2.2.1.). In terms of overhearing (e.g. workspace openness), Rashid et al. (2006), among others, argue that open workspaces enhance face-to-face interaction through both seeing and overhearing, indicating a relationship with the involvement and efficacy components of engagement. These findings indicate that knowledge sharing can be stimulated by specific office characteristics (e.g. workspace openness, density, distance between workplaces, etc. [Oldham & Rotchford, 1983]) and facilitates both innovation and firm performance (Wang & Wang, 2012).

However, Appel-Meulenbroek et al. (2016) also stress the paradox between the aforementioned characteristics. They argue that *“(…) while on one hand privacy is needed for concentration, on the other hand, speech intelligibility helps collaboration”* (Appel-Meulenbroek et al., 2016, p. 10). So clearly, the interaction and distraction components are related, as *“one person’s interaction is another person’s distraction”* (Haynes & Price, 2004). This is acknowledged by various authors. Haynes (2007a), for example, argues that the creation of the behavioural environment, with its components of interaction and distraction, contributes to knowledge, which in turn has been associated with feelings of greater professional efficacy (e.g. Maslach et al., 2001). Moreover, offices increasingly become environments that need to create and transfer knowledge and engagement to other team members, emphasising the continuous rise of knowledge workers that occupy offices.

Furthermore, Appel-Meulenbroek et al. (2015), argue that in order for certain activities to be effective, they have to be supported by different facilities (e.g. printers, storage, beverage machines, and other equipment). They state that employees are not homogeneous groups, but their personal characteristics influence the use of facilities as well (Appel-Meulenbroek et al., 2015). So, the facilities in an activity based office *“have to support the organisation, the individual users and their activities to provide added value”* (Appel-Meulenbroek et al., 2015), and may refer to feelings of perceived control and fairness (equity) within the work environment. Although the activity based concept is defined as not having assigned workplaces, most organisations still have some assigned facilities. Therefore, facilities can be seen as an important principle of the physical environment as well (see also Van der Voordt, 2004; De Croon et al., 2005).

This section discussed various characteristics related to the office layout. Based on the literature review, a selection of attributes has been made that may be used as input for the questionnaire, as can be seen in Figure 3.2. The selected attributes include the ‘workspace variety’ (e.g. different office types), ‘workspace availability’ (e.g. sufficient workspaces), ‘workspace openness’, ‘distance between workspaces’, and ‘facilities’ (e.g. printers, storage, beverage machines, and other equipment), whether or not assigned.

3.3.3. Office comfort

Based on previous research, Haynes (2007a) emphasised office comfort to be one of two most elementary components of the physical environment (the other being office layout). Accordingly, he defined ‘office comfort’ by ambient factors such as ventilation, heating, natural- and artificial lighting and more general attributes such as security, cleanliness and overall comfort (Haynes, 2007a; see also Section 3.1). Besides ambient factors, many academics referred to office comfort by emphasising the importance of (physical) ergonomics and easy access to (environmental) services (e.g. Evans & Johnson, 2000; Van der Voordt, 2004; De Croon et al., 2005). For the purpose of this research, this section will therefore be limited to ambient factors and ergonomics. For the attributes noise and privacy, among others, references are made to Section 3.3.5. (*‘distraction’*).

Bitner (1992) presented a framework in which she identified three environmental dimensions, being ‘ambient conditions’, ‘space and function’, and ‘signs, symbols and artefacts’ (Bitner, 1992). Accordingly, the ambient conditions and the space and function dimensions within this framework, replicated dimensions in the physical environment, being office layout and office comfort as proposed by Haynes (2007a). The signs, symbols and artefacts dimension, however, acknowledged the individual within the environment and include, among others, personal artefacts (e.g. personalising work desks) and style of décor (Bitner, 1992). In addition, Bitner stressed that *“one of the challenges in designing environments to enhance individual approach behaviours and encourage the appropriate social interactions is that optimal design for one person or group may not be the optimal design for other”* (p. 61), emphasising the importance of individual differences (see also Haynes, 2007b).

This approach is acknowledged by Vischer (2008a; 2008b), who focussed on the inclusion of users as well. Accordingly, she differentiated three levels of users (individual worker, team, and organisation) and three levels of environmental comfort (psychological, functional, and physical) to classify workers’ experiences (Vischer, 2008b). Vischer (2008a) found that *“employees waste time and energy when having to cope with poorly designed workspaces (...)”*. Accordingly, she introduced the term ‘functional comfort’, referring to *“environmental support for users’ performance of work related tasks and activities”* (Vischer, 2008a). Environmental support, in turn, may be associated with greater efficacy (e.g. Maslach et al., 2001). Besides traditional concepts of comfort (e.g. ambient factors), Vischer (2008a) used the term to include the workers’ environmental preferences as well.

Roelofsen (2002) examined the impact of office environments on employee performance, in which he emphasised the importance of the indoor environment. He argued that *“one of the*

fundamental human requirements is a working environment that allows people to perform their work optimally under comfortable conditions" (Roelofsen, 2002, p. 247). In addition, Roelofsen argued that buildings are designed on the basis of a certain level of discomfort, for which he distinguished various aspects of the indoor environment, being, among others, 'auditory indoor environment' (e.g. sound level), 'visual indoor environment' (e.g. lighting), 'air quality', and 'thermal indoor environment' (e.g. heating, ventilation) (Roelofson, 2002). Accordingly, the levels of discomfort would be amplified if users are not able to exert any control over such aspects. Subsequently, this lack of control over resources may be associated with greater burnout, especially the individual strain of exhaustion and the self-evaluation strain of inefficacy (e.g. Maslach et al., 2001; Bakker et al., 2013). According to Clements-Croome & Baizhan Li (1997), among others, performance, involvement and morale among employees would increase if they are able to exercise greater control over the indoor environmental characteristics (see also Roelofsen, 2002).

Previous studies have shown the complexity of the relationship between building conditions (e.g. thermal comfort, (artificial) lighting, moisture, noise, etc.) and human well-being (e.g. Jantunen et al., 1998; Bonnefoy et al., 2004), while other environmental stressors (e.g. vibration, poor air quality) can also produce negative stress (Bluyssen et al., 2010). Moreover, building, social and personal factors can influence one's perceived health and comfort. As such, they may influence employee well-being either positively (engagement) or negatively (burnout). Bluyssen et al. (2010) examined the relationship between these factors and comfort by studying building-specific data from the European Health Optimisation Protocol for Energy-efficient buildings (HOPE) and self-administered questionnaires from 5.732 respondents in 59 office buildings. They argue that "*perceived comfort is much more than the average of perceived indoor air quality, noise, lighting and thermal comfort responses*" (Bluyssen et al., 2010, p. 280). For example, not everybody perceives or responds to building conditions in the same way. According to Bluyssen et al. (2010), individual differences occur from physical, physiological and psychological differences, but also due to differences in history, context and situation. However, Jantunen et al. (1998) pointed out that some relationships between certain building characteristics and perceived comfort (of office workers) seem to exist, but these primarily focus on ambient factors. Besides the general ambient factors, the authors also found components such as privacy, excessive noise, decorations (e.g. shading) and cleanliness to be important aspects that could enhance the overall comfort (Bluyssen et al., 2010). Overall comfort, in turn, is assumed to be related to feelings of energy and greater efficacy. Notably, the authors conclude their research by stressing that "*the phenomenon 'perceived comfort' is far too complex to relate directly to one or multiple components, which not only vary per location and over time, but most likely have to compete with other variables of influence*" (Bluyssen et al., 2010, p. 286).

Opposite to Haynes (2007), who distinguished office layout and comfort as separate components of the physical environment, Van der Voordt (2004) and De Croon et al. (2005), among others, argue that office comfort is one of a number of aspects of the office layout. However, whilst Haynes (2007), to the utmost extent, defines comfort by ambient factors, Van der Voordt (2004) and De Croon et al. (2005) mostly refer to (physical) ergonomics and easy access to (environmental) services. In turn, ergonomics (e.g. office furniture) "*uses knowledge of human abilities and limitations to the design of systems and organisation to support safe, efficient and comfortable usage*" (Aaltonen et al., 2012, p. A5) and may be associated with feelings of greater professional efficacy. Physical ergonomics, on the other hand, primarily focus on the physical interactions people have with technical systems and how physiological characteristics (e.g. body posture) affect their performance. (Aaltonen et al., 2012), which, in turn, may be related to feelings of exhaustion and inefficacy.

Evans & Johnson (2000), in addition, found that exposure to low-intensity office noise demotivates workers to make adjustments to their ergonomic work-station in the long-term. More specifically, they found that participants produced behavioural aftereffects indicative of motivational

deficits and were less likely to make adjustments to work-station furniture (e.g. chairs, foot rests, whiteboards and document holders) under noisy conditions (Evans & Johnson, 2000).

This section discussed various characteristics related to the office comfort. Based on the literature review, a selection of attributes has been made that may be used as input for the questionnaire, as can be seen in Figure 3.2. The selected attributes include 'ambient factors' (e.g. air quality, heating, natural- and artificial lighting) and 'ergonomics' (e.g. office furniture).

3.3.4. Information and communication technology (ICT)

Many new ways of working, including activity based working, have been at least partly enabled by the development and deployment of information and communication technology (ICT) (e.g. Aaltonen et al., 2012). Accordingly, (mobile) workers have a great need for ICT that supports their work, or as Perry and Brodie (2005) pointed out *"mobile technologies should flexibly support both work practices and individual lifestyles"*. In addition, Lees and Thomas (1998) stressed that *"the overall process of doing knowledge work should be supported, including the ICT being an enabler instead of a hindrance in the on-going action of work"*. As such, organisations should provide their staff with high-quality information and communication services (e.g. Intranet, webmail), thereby allowing them to telework. From a management point of view, however, it is important to understand that the performance of activity based office concepts must be seen from an 'output' perspective, rather than a 'presence' one.

Information and communication technology has often been named as one of the key ingredients in the very definition of knowledge work (Pyöriä, 2005). According to Renaud et al. (2006), for example, *"a significant proportion of communication in organisational life, with clients and colleagues, far away or in close proximity, takes place online"*. In an era in which almost everything is done by computers or mobile tools, files are no longer stored in a file cabinet at work but in the Cloud and working from home, or third places, becomes more and more integrated, high-quality IT services are increasingly becoming important (e.g. Fleming, 2005; Maarleveld et al., 2009; Rothe et al., 2011). Since employees give a personal input to the organisation, individual technologies should maximise the workers personal benefits, as well as the organisations' benefits (Lees & Thomas, 1998).

One of a number of advantages related to the information and communication technology (ICT) component of activity based working, therefore, is the accessibility to tablets, computers and smartphones (e.g. email, planning). Accordingly, communication by email, whether or not by smartphones, is argued to be less time-consuming, more reliable and more efficient than face-to-face meetings (e.g. Berghel, 1997), as people can be reached more easily and quickly and geographic boundaries are taken away. Moreover, Middleton (2007) points out that sending and receiving emails is the main reason for having a mobile work telephone.

According to Cook and Das (2007), for example, *"ease of interaction is especially useful in office environments where workers need to focus on a project instead of technology"*. One of a number of possibilities is using motion detection in activity based work environments. These technologies allow organisations to detect or trace its employees. According to Streitz et al. (2007), for example, employees appreciated feeling the remote site's atmosphere, thereby knowing the number of people present and being aware of them without having a disturbing effect of others' privacy and workflow (see also Aaltonen et al., 2012). Mynatt et al. (2003) even found that visualising or projecting real-time information (e.g. the number of workers present/absent and their current/past activities) on office walls or whiteboards would relieve employees of some cognitive workload.

The introduction of information and communication technology in activity based offices was not only expected to replace face-to-face meetings partially, but also to increase the overall communication and interaction among co-workers and other staff members (Contractor & Eisenberg, 1990). However, opposite to the expectations, Sarbaugh-Thompson and Feldman (1998) found that

the implementation of information and communication technology has led to a net-decrease in overall communication. Moreover, using activity based offices, and information and communication technology in general, helps to increase the efficiency of communication but reduces the overall communication among organisational members. Research indicated that that mobile tools, indeed, can lead to increased productivity (Locke, 2005) and increased collaboration (Baron, 2005). In addition, smartphones are associated with improved responsiveness, availability of real-time information and faster decision making, indicating that job resources are not only important to deal with job demands, but are also important in their own right (Demerouti et al., 2014).

Whereas advocates, for example, refer to the efficiency and reliability of information and communication technology (e.g. email, smartphone), adversaries may refer to the potential pitfalls of such mobile devices. Accordingly, research has found that employees' perceived overload is triggered by aspects of their email use, whether or not in addition to the length and number of messages received (Rennecker & Derks, 2012). For example, the pressure to respond quickly (e.g. Derks & Bakker, 2010), unanticipated tasks resulting from received messages (Thomas et al., 2006), various role demands (Derks & Bakker, 2010), the lack of control over incoming messages (Allen & Shoard, 2005), and interruptions and task-switching generated by responding to emails (e.g. Russell et al., 2005) have all been associated with perceived work overload (see also Demerouti et al., 2014). In addition, Rubinstein et al. (2001) found that the latter (task switching) *"resulted in a delay before engaging effectively in a new task, even if the worker had been previously engaged in the task"*. More specifically, he argued that *"each fragmentation of a task adds to the total time required to complete it"* (Rubinstein et al., 2001), thereby reducing the productivity. So, although active users of information and communication technology are argued to outperform non-users, they also report feelings of isolation (referring to a lack of social support), have trouble working without the structure of the organisation, experience distraction from family and friends (Allen et al., 2003) and experience high work pressure and job overload (Galinsky et al., 2001), indicating that information and communication technology may be a helpful resource for the sender but a demand for the receiver.

This section discussed various characteristics related to the information and communication technology. Based on the literature review, a selection of attributes has been made that may be used as input for the questionnaire, as can be seen in Figure 3.2. The selected attributes only include 'ICT-services' (e.g. mobile tools, Intranet, cloud computing).

3.3.5. Office use

Previous research towards office use primarily focussed on the physical aspects (e.g. fixed vs. shared workspaces) of the office environment (e.g. Van der Voordt, 2001; De Croon et al., 2005), but few have investigated the behavioural aspects of office use. As argued by Haynes (2007a, 2007b), the behavioural environment concerns the employees and the interaction they have with the physical environment. This section gives an extensive overview of the attributes pertaining to the office use. Although the activity based working concept is based on a set of rules (e.g. employees choose the workplace that best fits the activity), this section is limited to the following aspects; claiming- and switching behaviour, interaction and distraction, noise and privacy.

Research on the end-users perspective of activity based office concepts by Appel-Meulenbroek et al. (2011) shows, for example, that activity based work environments, in many cases, are not used as intended. For instance, the authors found that workstations are still claimed by using personal accessories, referring to claiming behaviour of the non-personal workstations, which does not seem to match the idea of the activity based concept regarding desk-sharing (e.g. Appel-Meulenbroek et al., 2011). Whereas desk-sharing is argued to improve communication between office workers (De Croon et al., 2005), claiming behaviour may result in the opposite. Consequently, claiming behaviour may be associated with feelings of unfairness and conflicting values and may be related to

the exhaustion and cynicism components of burnout. In addition, claiming behaviour has a moderate correlation with the inefficacy component of burnout, especially if the conflict in values is perceived to be of a structural nature (e.g. Maslach et al., 2001). Appel-Meulenbroek et al. (2011) also show that around 60 percent of the end-users feel that there is a suitable workplace for each activity. However, the balance between individual and team workspaces is missing. Although many employees mention that workplace aspects such as comfort and ergonomics can cause a change of workplace when there becomes one available that is more suitable to the functional and personal needs of the employee and its activity, the majority indicates to never actually switch workplaces. This may indicate low levels of perceived task variety which is associated with respectively the individual strain of exhaustion (task variety) and the self-evaluation strain of inefficacy (task significance) (e.g. Maslach et al., 2001). Nevertheless, this clearly indicates that the willingness to switch workplaces (desk-switching) is hardly present, which does not seem to match the idea of the activity based concept.

In addition, Hoendervanger et al. (2015) argue that *“the presumed effectiveness is merely based on the assumption that within an activity based work environment, workers are able to use an appropriate workplace, one that is specifically designed for the activity at hand, at all times”* (p. 2). Moreover, there is reason to doubt the effectiveness of activity based work environments. Especially as a ‘one size fits all’ solution for all organisations and individuals. This is acknowledged by many studies in which the comparison between activity based work environments and other types of work environments have led to mixed and sometimes contradictory findings regarding variables such as performance, satisfaction, health and well-being (e.g. Van der Voordt, 2004; De Croon et al., 2005; Bodin Danielsson & Bodin, 2008; Appel-Meulenbroek et al., 2011; De Been & Beijer, 2014; Appel-Meulenbroek et al., 2015).

Similar to the physical environment, Haynes (2007a) argued that the ‘interaction’ component of the behavioural environment can be defined by attributes such as social- and work interaction, atmosphere, position relative to the office equipment, and overall office layout. Consequently, the ‘distraction’ component can be defined by attributes such as interruptions, perceived feeling of crowding and noise (Haynes, 2007a). However, opposite to the physical environment in which job resources are generally provided, characteristics of the behavioural environment have primarily been associated with greater burnout or job demands (e.g. Maslach et al., 2001; Bakker et al., 2013), indicating that the way workers interact with the physical environment may have a greater influence on, for example, the productivity than the physical environment itself. More specifically, the interaction and distraction components of the behavioural environment may be closely related to the individual strain of exhaustion and the interpersonal strain of cynicism.

This is acknowledged by Mawson (2002), Olson (2002) and Haynes (2007b), among others, who found that the behavioural environment has a greater influence on the perceived productivity among office workers than the physical environment. Moreover, they argue that the behavioural components of interaction and distraction have the biggest effect on perceived productivity, of which distraction appears to have the biggest negative effect. Distraction, or disturbance determines the degree to which social interaction is allowed, or even stimulated. In addition, Olson (2002) found that noise coming from surrounding occupants having conversations is the biggest source of disturbance in and around regular workspaces. So, activities that are paired with distraction (e.g. meetings, conversations, etc.) can be conducted in the areas that are specifically designed for these purposes and therefore limit the amount of distraction (e.g. noise, privacy). In other words, these areas limit the potential to increase levels of burnout. However, Olson (2002) also emphasises the importance of being able to work distraction-free. This indicates that although workspaces that stimulate interaction are important for the overall performance, they are not to be replaced for distraction-free workspaces. Instead, both type of workspaces should be present in the activity based office. The challenge for managers responsible for managing office environments, therefore, is maximising the

interaction component, whilst at the same time minimising the distraction component (Haynes, 2007a). More specifically, in terms of the burnout – engagement continuum, the challenge is to maximise the presence of job resources, whilst at the same time minimising the amount of job demands.

As mentioned before, Olson (2002) found that noise coming from surrounding occupants having conversations is the biggest source of disturbance in and around regular workspaces. Evans and Johnson (2000) extensively studied the effects of stress and open-office noise. Notably, research on non-auditory effects of noise (e.g. annoyance, motivation) has primarily focused on high-intensity, ambient sources of noise (Evans & Johnson, 2000). Accordingly, the authors examined the short-term reactions to realistic levels (low-intensity) of noise exposure commonly found in open-offices. According to Becker (1981) and Sundstrom (1986), among others, noise is among the most prevalent annoyance sources in offices, with great potential to enhance (psychophysiological) stress (Evans & Johnson, 2000). In addition, Sundstrom et al. (1994), in their research towards relocated office workers, demonstrated that workers who experienced more office noise after they relocated *“experienced greater disturbance from noise, were less satisfied with their new work environment, and had the lowest levels of overall job satisfaction”* (see also Evans & Johnson, 2000). Research suggests that exposure to uncontrollable noise leads to aftereffect deficits in task performances (e.g. Cohen, 1980), which may be associated with greater exhaustion (e.g. Maslach et al., 2001). For example, they argued that individuals exposed to uncontrollable noise were less likely to persist challenging tasks (Glass & Singer, 1972). Similar to Cohen (1980) and Glass and Singer (1992), Evans and Johnson (2000) found that the uncontrollability of sound, rather than its intensity is what makes it stressful. In conclusion, the authors found that participants in noisy conditions did not differ in perceived stress and even habituated to noise exposure, especially if workers felt that little is done in response to their complaints (Evans & Johnson, 2000).

In addition, Appel-Meulenbroek et al. (2011) found that different types of workplaces in an activity based office environment provide the opportunity to regulate the amount of social interactions with others, thereby increasing a sense of involvement (Appel-Meulenbroek et al., 2011). Although working at home can be more productive at busy days, many employees intentionally come to the office to maintain their social relationship with colleagues. Regarding the distraction component, many indicators can be distinguished. For example, employees generally rate (auditory) privacy as an important variable for making, among others, private calls or formal meetings. In line, they mention that they are easily distracted when they see things happening around them, indicating a strong need for visual privacy as well (Appel-Meulenbroek et al., 2011). Lack of privacy has been associated with greater feelings of exhaustion, which in turn can cause employees to become cynical (e.g. Bakker et al., 2013). In line with these findings, Lee and Brand (2005) found that personal control (e.g. over ergonomics and ambient factors) and easy access to meeting places can lead to a higher perceived group cohesiveness and job satisfaction. In turn, they found that job satisfaction is positively related to perceived performance. This is also acknowledged by Roelofsens (2002), who found that improving the indoor climate improves the performance and that the indoor environment has an effect on the perceived productivity of office workers as well.

This section discussed various characteristics related to the office use. Based on the literature review, a selection of attributes has been made that may be used as input for the questionnaire, as can be seen in Figure 3.2. The selected attributes include ‘desk-switching’ (e.g. switching behaviour), ‘desk-sharing’ (e.g. claiming behaviour), ‘interaction’ (e.g. social interactions, work-related interactions), ‘distraction’ (e.g. interruptions, crowding), ‘noise’ (e.g. sound level, annoyance) and ‘privacy’ (e.g. auditory-, visual privacy).

3.3.6. Office location

One of the key principles of the activity based working concept is that organisations facilitate their employees with the opportunity or flexibility to work outside the office. The most well-known and widely adopted option, besides working at the office, is teleworking, referring to the opportunity or flexibility to work at home. However, a third option is rapidly gaining popularity; more and more people choose to work at third places, referring to the opportunity to work in between the home and the organisation. These third places (e.g. Starbucks, campuses) provide an effective place for people to work on the pause and are not owned or leased by an employing company but shared by people and used on a need basis (Ross, 2010). This phenomenon has become known as 'geopresence' (Ross, 2010). This section gives an extensive overview of the benefits and pitfalls that come along with working outside the office.

Zedeck and Mosier (1990), among others, argued that employees who use new ways of working or activity based working, thereby more often working from home, experience enhanced autonomy and control, increased flexibility in scheduling (e.g. working hours), and reduced costs for transportation. In addition, they argue that these employees are better able to cope with family demands since they can take care of children at the same time (Zedeck & Mosier, 1990). Besides individual benefits, teleworking has also been associated with benefits for the organisation and society (Harpaz, 2002). According to Harpaz (2002), for example, organisations benefit directly from teleworking through increased human resource capacity and savings in direct expenses. For example, less workplaces, square meters and associated costs are needed to facilitate the workforce (Hoendervanger et al., 2015). In addition, Sánchez et al. (2007) examined the relationship between teleworking and organisational performance. Their research showed a positive relationship between organisational performance and the use of teleworking, flex-time, contingent work and spatial decentralisation (Sánchez et al., 2007). More specifically, the authors argue that flex-time, employee involvement (in design and planning), intensive management based on results (rather than presence), and variable compensations are the foundation of increased performance for teleworking organisations (Sánchez et al., 2007). Consequently, the society benefits from reduced environmental damage and savings in infrastructure and energy (Harpaz, 2002).

In addition, organisations could address information and communication services to support telework. By introducing, for example, motion control at the office, one might be able to receive information regarding the number of people present at the office, thereby estimating whether (particular) workstations are available. If not, one might be able to decide to work at home, or at third places (e.g. cafés, hubs). In addition, 'cloud computing' relieves the user from carrying around stored data or computing power (e.g. Kaufman, 2009), although this generally requires broadband WLAN. For those working remotely, Teasley et al. (2000), among others, thought it was important to be 'present' at work at the same time. As such, teleconferencing (audio- and video-conferencing) allows workers to be visible and audible through an open connection, thereby diminishing the physical boundaries that separates them.

Whereas advocates of 'telework', for example, mention a positive relationship with work-home interference, adversaries may argue that telework reduces the sense of community among co-workers and other staff members. Consequently, reduced feelings of community result in a lack of (active) feedback and support from either supervisors and co-workers which, in turn, may be (positively) related with the individual strain of exhaustion, interpersonal strain of cynicism, and the self-evaluation strain of inefficacy (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). Zedeck and Mosier (1990), for example, pointed out that teleworking might restrict career development for vulnerable groups (e.g. elderly individuals, pregnant couples), since they are isolated from the organisation, thereby potentially diminishing their promotion possibilities (Demerouti, 2006). In addition, working from home whilst being permanently connected at the same time may indicate that

work never stops. Strict lines for both the beginning and end time are diminished as a result of the perceived flexibility and autonomy that comes along with teleworking. So, although it might be beneficial for individuals, it might also extend the workday, hence increase workload and job stress. This is acknowledged by Peters and Van der Lippe (2007), who found that telecommuters experience more time pressure in the long run, while making longer work hours. In addition, it is argued that working at home may increase distraction (work-home interference), whereas greater concentration was expected, hence an increased workload. Whereas greater distraction is associated with all three components of burnout (see also Table 2.2), excessive workload is closely related with greater exhaustion (e.g. Maslach et al., 2001).

Telework facilitates employees to be separated in time and place, thereby reducing the possibility to gain social support and participate in social activities (e.g. Sonnentag et al., 2012; Demerouti et al., 2014). So, although telework may increase work performance in terms of productivity, it reduces work-related activities such as personal participation in organisational decision-making, which may be related to the exhaustion component of burnout (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). In turn, a lack of presence at work may result in perceived inequities towards (intrinsic) rewards and promotions and, hence, increase role conflict, role ambiguity and conflicts in values which are all related to the three components of burnout (e.g. Maslach et al., 2001; Maslach & Leiter, 2008). The same mechanism applies to feedback, as teleworkers may experience less feedback possibilities. While feedback is an important job resource, employees prefer either giving or receiving feedback face-to-face rather than receiving it through email as it is impersonal and may result in increased stress. Moreover, the constructive aspect of feedback makes it an important resource to refuel employee motivation (Bakker & Demerouti, 2007).

However, Bakker et al. (2005a), for example, found that job demands such as work overload, emotional demands, physical demands and work-home interference did not result in high levels of burnout if employees experienced autonomy, received feedback and had social support from either co-workers or supervisors at the same time, indicating that job resources have a moderating role in the relationship between job demands and burnout. This combination of low job demands and high job resources significantly added to the prediction of the energy and involvement components of engagement (Bakker et al., 2005a). In turn, this stimulates employees to show proactive behaviour such as job crafting and creativeness and benefits the organisation as a whole (e.g. Bakker et al., 2005a; see also Section 2.2.2.).

This section discussed various characteristics related to the office location. Based on the literature review, a selection of attributes has been made that may be used as input for the questionnaire, as can be seen in Figure 3.2. The selected attributes include 'telework' (e.g. working from home) and 'geopresence' (e.g. working in between home and work). For the purpose of this research, both attributes are referred to as 'telework'.

3.4. Conclusions

Based on the variety of components related to the physical work environment, the definition which will be used during this research is a more general one; the physical work environment is any workplace in which work is conducted and all the physical aspects within that (office) building. Opposite to the physical environment in general, the activity based work environment is fairly clear regarding its definition and principles. Consequently, activity based working refers to the idea that *"people can work flexibly, using different types of workplaces, designed to support different types of activities"* (Veldhoen, 2008; Hoendervanger et al., 2015).

Notably, much of the activities conducted within office environments are related to developing and manipulating information (e.g. desk based, meetings, conversations, reading, creative

thinking), since numerous activities with high perceived importance require interaction among co-workers and other staff members. So, in order to maximise the interaction component whilst at same time minimising the distraction component, it is very important to understand the different types of activities (knowledge) workers generally conduct in activity based offices. Accordingly, three main knowledge worker activities were identified, being concentration work, formal interaction, and informal interaction.

Regarding its specific characteristics, it has been argued that the most important characteristics of the activity based office, from a physical point of view, are the office layout, office comfort, information and communication technology, office use and office location. As a result, these components will be the core focus of this research, in terms of the physical environment.

Based on the literature it can be concluded that these components may all be associated with both job resources and job demands, thereby possibly influencing the burnout – engagement continuum. Accordingly, the most important attributes of the office layout which are believed to stimulate engagement among employees are the availability and variety of workplaces (e.g. (in)formal areas, quiet areas, private areas, (personal) storage, etc.), workspace openness, distance between workspaces (e.g. walking distance <30 m, overhearing <10 m) and facilities (e.g. printers). In terms of the burnout – engagement continuum, these attributes are believed to increase the levels of perceived privacy, autonomy, task variety and task significance, which are all related to the three components of engagement. On the contrary, these attributes are also believed to increase role conflict (e.g. conflicting demands) and role ambiguity (e.g. lack of adequate information), which are related to the three burnout components.

With regard to the office comfort, the attributes ambient factors and (functional) ergonomics have been argued to influence the perceived comfort in and around regular office spaces. Although all attributes may have the potential to either increase or decrease the levels of burnout and engagement, the levels of discomfort may be amplified if users are not able to exert any control over such aspects. Subsequently, this lack of control over resources may be associated with greater burnout, especially the individual strain of exhaustion and the self-evaluation strain of inefficacy.

The most important attributes of the information and communication technology-component (ICT), that may influence the burnout – engagement continuum, are ICT-services. Whereas advocates, for example, refer to the efficiency and reliability of ICT-services (e.g. Intranet, email, smartphone), adversaries may argue that employees' perceived overload is triggered by aspects of their email use (e.g. pressure to respond quickly, various role demands, lack of control over incoming messages). In addition, it was found that the implementation of ICT has led to a net-decrease in overall communication. Moreover, using activity based offices, and information and communication technology in general, helps to increase the efficiency of communication but reduces the overall communication among organisational members, indicating that information and communication technology may be a helpful resource for the sender but a demand for the receiver. Noteworthy, many new ways of working, including activity based working, have been at least partly enabled by the development and deployment of information and communication technology.

With regard to the office use it is more difficult to establish the potential relationship of the attributes (desk-switching, desk-sharing, interaction, distraction, noise, and privacy) with the components of the burnout – engagement continuum, since these are more likely to depend on individual preferences and needs for well-being. For instance, work desk personalisation might be beneficial for some individuals in terms of, for example, concentration and productivity, whereas other individuals might prefer clean and abstract office environments. With regard to the interaction and distraction components, the influences are clearer. Both attributes have been associated with the individual strain of exhaustion and the interpersonal strain of cynicism. In addition, the attributes noise and privacy have been associated with all three components of the burnout – engagement

continuum. Noise, coming from surrounding occupants having conversations, however, was found to be the biggest source of disturbance in and around regular workspaces.

The most important attributes of the office location, that may increase burnout, are telework and geopresence. To recapitulate, telework refers to the opportunity or flexibility to work at home, whereas geopresence refers to the opportunity to work in between the home and the organisation, also called third places. Both attributes are believed to decrease the amount of interaction with both co-workers and other staff members, thereby reducing the possibility to obtain social support and feedback. In addition, it was found that working from home might diminish career opportunities as well as the possibility to actively participate in organisational decision-making. Accordingly, these attributes are believed to increase the workload and time pressure, which have been the most important types of job demands and have been positively related to burnout consistently throughout burnout literature (e.g. Maslach et al., 2001; Bakker et al., 2013). On the positive side, telework and geopresence are argued to increase employee performance, which may be related to the three engagement components. For the purpose of this research, both attributes are referred to as telework.

So, based on these principles, it can be concluded that the physical environment of an activity based office, besides its activities, can be characterised by five main aspects, being office layout, office comfort, information and communication technology, office use and office location, as can be seen in Figure 3.2.

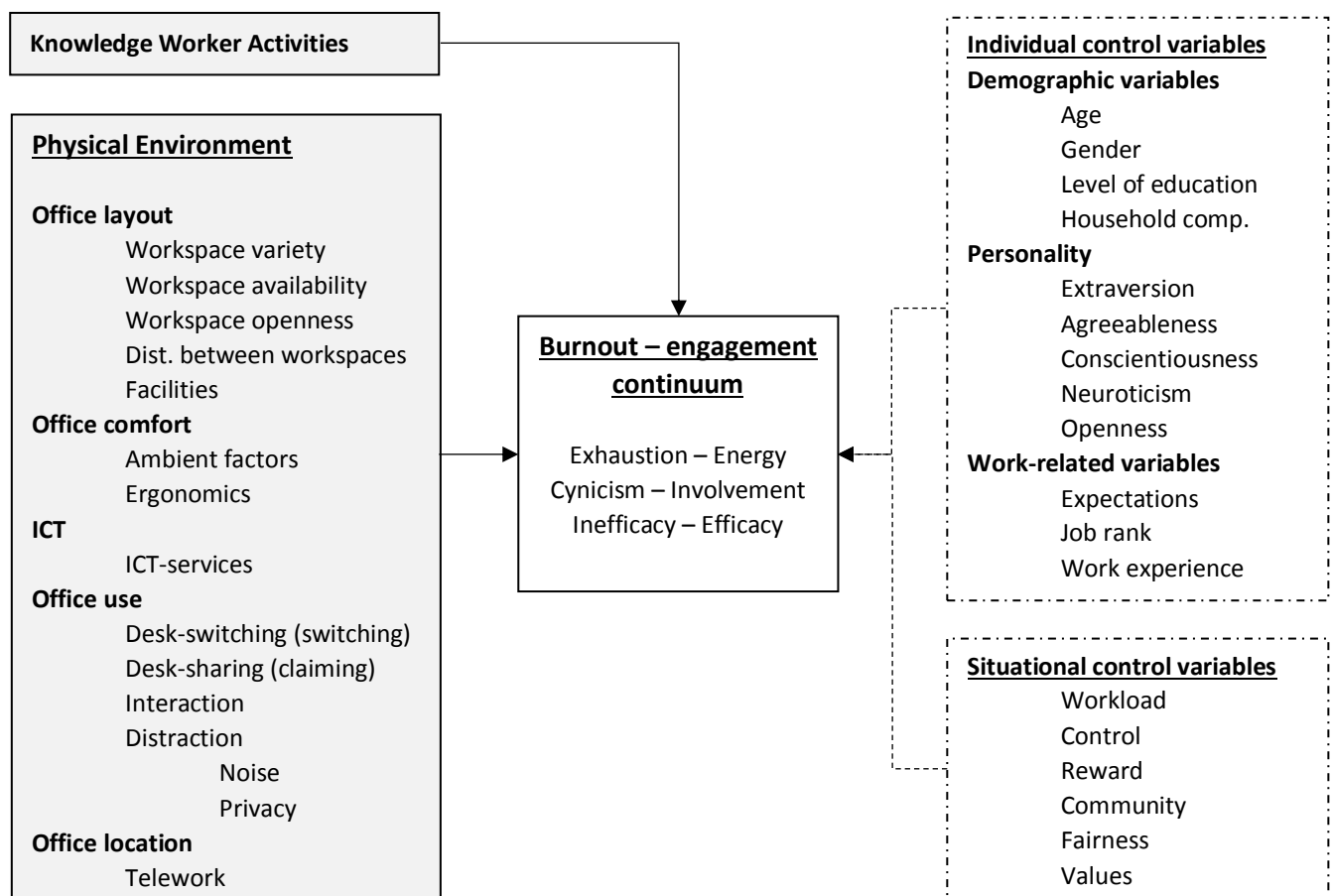


Figure 3.2: Conceptual model – elaboration of the physical environment component

4. Research approach

This chapter initiates the process of answering sub question 3: What is the relationship between the physical environment and the burnout – engagement continuum? Whereas Chapter 1 and Chapter 2 delineated the scope and relevance of this research, Chapter 3 outlines the approach of this research. After a brief recapitulation of the previous chapters, the output variables from the literature study are operationalised in section 1, since these are used as input for the questionnaire. Section 2 elaborates on the questionnaire that is used for the data collection. Finally, Section 3 accounts for the statistical tests used for the analyses of the data.

Recapitulation

This research is a quantitative research with an exploratory character. In Chapter 2, the burnout – engagement continuum is elaborated, in which it became clear that the burnout – engagement continuum consists of three interrelated dimensions, being the individual strain of exhaustion (B) – energy (E), interpersonal strain of cynicism (B) – involvement (E), and self-evaluation strain of inefficacy (B) – efficacy (E). In addition, the situational- and individual variables that are assumed to correlate with the burnout – engagement continuum were described. In chapter 3, it became clear that office innovation has led to the creation of activity based offices and that there are many specific physical workplace aspects for these offices. Eventually, the specific physical workplace aspects, identified in Chapter 3, were theoretically linked to the burnout – engagement continuum dimensions that were defined in Chapter 2. Literature research was conducted in order to find an answer to sub question 1 and 2, which has led to the construction of the conceptual model as can be found in Figure 3.2. This chapter outlines the approach of the research that is conducted to test such presumptions.

4.1. Data collection

Despite the fact that some research has been done on burnout and engagement in relation to aspects of the physical environment, the influence of distinct characteristics of activity based office environments on the burnout – engagement continuum dimensions has never been investigated before. Moreover, there is no existing data to test the relationships between these variables. Therefore, data is collected by means of a survey. Baarda et al. (2014) argue that an online questionnaire is a useful tool to conduct a survey. Accordingly, this method is a useful technique for collecting data, with low costs for the researcher and little effort needed from the respondents (Baarda et al., 2014). They also mention that distributing surveys online is useful to reach many respondents and good response rates can be obtained since the respondents can remain anonymous (Baarda, 2009). The questionnaire that was distributed for this research can be found in Appendix C.1 (English version) and Appendix C.2 (Dutch version).

4.1.1. Operationalisation

This section covers the operationalisation of the variables that are included in the questionnaire. In other words, the variables found in Chapter 2 and Chapter 3 (see also Figure 3.2) are converted into measurable forms by linking them to a level of measurement (LoM). In turn, the level of measurement forms the basis for formulating the questions and answering options in the questionnaire.

First, the personal and work-related (socio-demographic) characteristics of the respondents are operationalised. Next, the part in the questionnaire that addresses the personality characteristics is operationalised, followed by an operationalisation of the situational variables. Fourth, the part in the questionnaire that addresses the burnout – engagement continuum is operationalised. Finally, the

characteristics regarding the specific physical workplace aspects are operationalised. More specifically, the knowledge workers' activities are operationalised first, followed by the operationalisation of the remaining characteristics.

Socio-demographic characteristics

For defining the socio-demographic characteristics of respondents, eight different variables were distinguished. The first four variables address the personal characteristics, followed by four variables that address the work-related characteristics of the respondents. Table 4.1 shows an overview of the operationalisation of the socio-demographic variables.

Table 4.1: Operationalisation socio-demographic characteristics

<i>Variable</i>	<i>Level of measurement</i>	<i>Item</i>
Gender	Nominal	Multiple choice (2): 1 = Male 2 = Female
Age	Interval / Ratio	Open question (integer): Year of birth is [...]
Education level	Ordinal	Multiple choice (5): 1 = Primary education 2 = Secondary education 3 = Vocational education 4 = Undergraduate (University Bachelor level) 5 = Postgraduate (University Master or PhD)
Household composition	Nominal	Multiple choice (5): 1 = Married / living together without children 2 = Married / living together with children 3 = Single without children 4 = Single with children 5 = Other [...]
Job Rank	Nominal	Multiple choice (6): 1 = Intern / trainee 2 = Administrator 3 = Regular employee 4 = Manager 5 = Board member 6 = Other
Contract – nature	Nominal	Multiple choice (2) 1 = Permanent contract 2 = Temporary contract
Contract – length prof. workweek	Interval / Ratio	Open question (integer): Average working hours [...] per week
Contract – telework	Interval / Ratio	Open question (integer): Average working hours 'at the office' [...] per week
Work experience – current empl.	Interval / Ratio	Open question (integer): Years of employment at current employer [...]
Work experience – employers	Interval / Ratio	Open question (integer): Employers [...]
Expectations – nature of work/success	Ordinal	Multiple choice (5): 1 = Very low expectations 2 = Low expectations 3 = Average expectations 4 = High expectations 5 = Very high expectations
Expectations – outcome	Nominal	Multiple choice (5): 1 = Yes 2 = No

Demographic characteristics

Four variables were included in the questionnaire to address the personal characteristics. The first two variables of gender and age are frequently used and have a more standard operationalisation. For

gender, a two-item multiple choice question is used with the options male or female. Consequently, age is addressed by an open question in which the respondents can answer with an integer number to indicate their year of birth.

The respondents' level of education can be obtained in various ways. A commonly used method, however, is by means of a multiple-choice question, in which the respondents can indicate their highest degree of education. The respondents were given a set of five educational levels from which they could choose, being 'primary education', 'secondary education', 'vocational education', 'undergraduate education (University Bachelor level [Vosters, 2017])' and 'postgraduate education (University Master or PhD [Vosters, 2017])' (e.g. De Been & Beijer, 2014).

The last question addressing the personal characteristics concerns the household composition. This question was added to the questionnaire as a result of Maslach et al. (2001) stating that unmarried employees are more likely to experience burnout compared to those who are married, while single employees seem to report even higher burnout levels. This question concerns a multiple-choice question with five answering options that contain the most common household compositions for people that belong to the capacitated labour force (Vosters, 2017). The first four answering options are 'married / living together without children', 'married / living together with children', 'single without children' and 'single with children'. The fifth option concerns the option 'other', which could be used by respondents to fill in their specific household composition manually when theirs was not present in the previous answering options (e.g. divorced with/without children).

Work-related characteristics

Similar to the personal characteristics, four variables were included in the questionnaire to address the work-related characteristics. Job rank can be classified in many ways. For example, Danielsson (2005) proposed a job classification in which job ranks were divided into 'low rank job', 'low middle rank job', 'high middle rank job' and 'high rank job', which appears to be similar to the often proverbial used classification of 'Junior', 'Mediocre', and 'Senior' job ranks. According to Hartog (2015), however, these distinctive classifications were not sufficiently clear. Accordingly, she proposed to use the terms 'regular worker', 'support staff', 'manager', and 'board member' (Hartog, 2015). For this research, the most common job ranks were selected and implemented in the questionnaire, while the option 'other' was added. The six answering options respondents can choose from are 'intern/trainee', 'administrator', 'regular employee', 'manager', 'board member', and 'other'.

Next, respondents were asked three questions that address their contractual situation. The first question addresses the nature of the contract. For the purpose of this research, the answering options were limited to two options in which the respondents were asked to indicate whether they have a permanent or a temporary contract. The second question addresses the length of their professional workweek. Consequently, this variable is addressed by an open question in which the respondents can answer with an integer number to indicate their average working hours per week. More or less similar to the previous question, the third question concerns the average amount of hours that the respondents spend working at the office. This question was added to the questionnaire to obtain more insight in the amount of workers and the amount of time respondents conduct telework, or work outside the office in general. Consequently, this variable is addressed by an open question in which the respondents can answer with an integer number to indicate their average working hours per week at the office.

Respondents were also asked about their years of employment at the current employer and the number of employers they have worked for in their professional career. Both questions are concerned with the *work experience* of the respondents and are added to the questionnaire as a result of Maslach et al. (2001), among others, stating that age is confounded with work experience, suggesting that burnout appears to be more of a risk earlier in one's career. Both questions are open,

integer questions in which respondents were asked to fill in respectively the years of employment at their current employer and the number of employers they have worked for, including their current employer.

In addition, two questions were included in the questionnaire that address the respondents' expectations. The first question concerns the respondents' expectations in terms of the *nature of work*, referring to exciting, challenging and fun work (Maslach et al., 2001), and the respondents' expectations in terms of the *expected likelihood of achieving success* (e.g. getting promoted). In Section 2.4, Maslach et al. (2001) pointed out that people have different expectations when it comes to their work. They argued that in the case of very high expectations, people tend to work too hard and too much, potentially resulting in "(...) *exhaustion and eventual cynicism when the high effort does not yield the expected results*" (Maslach et al., 2001, p. 411). For the second question, therefore, respondents are asked to indicate whether their initial expectations have become true. For the first question, respondents were asked to rate their expectations, using a 5-point Likert scale ranging from 1 (very low) to 5 (very high). For the second question, a two-item multiple choice question is used with the options yes or no.

Personality characteristics

For defining the personality of respondents, five different variables were distinguished. Accordingly, these variables were addressed by using ten different questions. More specifically, for defining the personality of respondents, the BFI-10 (Big Five Inventory) was used (Rammstedt & John, 2007). Table 4.2 shows an overview of the operationalisation of the personality characteristics.

Table 4.2: Operationalisation personality characteristics

Variable	Indicator	Level of measurement	Item
Extraversion	Reserved (R) Outgoing, sociable	Ordinal	
Agreeableness	Generally trusting Finds fault with others (R)	Ordinal	Multiple choice (5): 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
Conscientiousness	Tends to be lazy (R) Thorough job	Ordinal	
Neuroticism	Relaxed, handles stress well (R) Gets nervous easily	Ordinal	
Openness	Few artistic interests (R) Active imagination	Ordinal	

Five variables were included in the questionnaire to represent the 'Big Five' personality characteristics. Subsequently, a total of ten questions were included in the questionnaire to address these personality factors, in which each characteristic is addressed by two questions. During the selection of the items for the BFI-10 (Big Five Inventory), Rammstedt and John (2007) made sure to represent each factor with both a high and a low pole, so that each BFI-10 scale would consist of one true-scored and one false-scored item. In Table 4.2, the reversed-scored items are indicated by '(R)'.

The first set of questions addresses the personality trait extraversion. For these questions, the respondents were asked to indicate the extent to which they rather see themselves as being reserved, or as outgoing and sociable. The corresponding statements are as follows: '*I see myself as someone who is reserved*' and '*I see myself as someone who is outgoing, sociable*'.

The second set of questions addresses the personality trait agreeableness. For these questions, the respondents were asked to indicate the extent to which they rather see themselves as being generally trusting, or as someone who tends to find fault with others. The corresponding statements are as follows: '*I see myself as someone who is generally trusting*' and '*I see myself as someone who tends to find fault with others*'.

The third set of questions addresses the personality trait conscientiousness. For these questions, the respondents were asked to indicate the extent to which they rather see themselves as someone who tends to be lazy, or as someone who does a thorough job. The corresponding statements are as follows: *'I see myself as someone who tends to be lazy'* and *'I see myself as someone who does a thorough job'*.

The fourth set of questions addresses the personality trait neuroticism. For these questions, the respondents were asked to indicate the extent to which they rather see themselves as someone who is relaxed and handles stress well, or as someone who gets nervous easily. The corresponding statements are as follows: *'I see myself as someone who is relaxed, handles stress well'* and *'I see myself as someone who gets nervous easily'*.

The last set of questions addresses the personality trait openness. For these questions, the respondents were asked to indicate the extent to which they rather see themselves as someone who has few artistic interests, or as someone who has an active imagination. The corresponding statements are as follows: *'I see myself as someone who has few artistic interests'* and *'I see myself as someone who has an active imagination'*.

For all questions related to personality, statements were drafted in a way that respondents were able to answer them by using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Accordingly, this method facilitates the opportunity to perform a factor-analysis in which items can be combined into variables. In addition, the statements were drafted in a way that they include their antithesis. For example, strongly agreeing to the first statement may indicate (i.e.) introversion, while strongly agreeing with the second statement may indicate (i.e.) extraversion. To improve the transparency of Table 4.2, all statements have been bundled to its corresponding dimension. For the sequence used in the questionnaire, see Appendix C.

In addition, Alarcon et al. (2009), in their meta-analysis of the relationship between personality and burnout, showed that the Big Five personality factors, being extraversion, agreeableness, conscientiousness, and emotional stability (neuroticism) all have a consistent negative relationship with each of the three burnout dimensions, with the exception of openness to experience which has a positive relationship with the efficacy (or personal accomplishment) component of engagement (Alarcon et al., 2009; see also Bakker et al., 2013).

Situational variables

For defining the situational variables, six different variables were distinguished. Accordingly, these variables were addressed by using eleven different questions. Table 4.3 shows an overview of the operationalisation of the situational variables.

Table 4.3: Operationalisation situational variables

Variable	Indicator	Level of measurement	Item
Workload	Job overload	Ordinal	Multiple choice (5): 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
Control	Authority	Ordinal	
	Control		
Rewards	Active participation		
	Financial rewards	Ordinal	
	Social rewards		
	Intrinsic rewards		
Community	Social support co-workers	Ordinal	
	Social support supervisors		
Fairness	Input/output	Ordinal	
Values	Trade-off	Ordinal	

Six variables were included in the questionnaire to address the situational variables. The situational variables include workload, control, rewards, community, fairness and values, and, together, these

organisational risk factors encompass the six key domains of the workplace environment (Maslach et al., 2001; see also Section 2.1.1. and Section 2.2.1.). For each question that addresses a specific situational variable, respondents were asked to indicate the extent to which they agree or disagree with the corresponding statements. A 5-point Likert scale was used ranging from 1 (strongly disagree) to 5 (strongly agree). Similar to the personality statements, these statements were drafted in a way that they include their antithesis, in terms of the burnout – engagement continuum.

The first variable addressing the organisational risk factors is workload. For this variable, one statement was added to the questionnaire in which respondents were asked to indicate whether they perceived their workload to be overloaded on a chronic basis, instead of an occasional emergency. Moreover, chronic job overload may be an incentive of burnout, while a sustainable workload may be an incentive for engagement (e.g. Maslach & Leiter, 2008). The question is stated as follows: *'I have too much work to do'*.

Next, respondents were asked three questions addressing the organisational risk factor of perceived control. Control often refers to indications that individuals have insufficient control over the resources required to do their jobs, or to a lack of authority to pursue the work in a way that they believe is the most effective one (e.g. Maslach et al., 2001). Based on the literature (e.g. Maslach et al., 2001; Maslach & Leiter, 2008) respondents were asked to indicate the extent to which they agree or disagree with the following statements: *'I can decide myself about the way I perform my job (tasks and duties)'*, *'I perceive my authority to be sufficient to pursue the work in a way that I believe is the most effective'* and *'I am able to actively participate in organisational decision-making'*.

Respondents were also asked questions addressing the received recognition and rewards. In Chapter 2, it has been elaborated that rewards can either be of financial-, social or intrinsic nature, with the latter referring to pride of doing something important (Maslach et al., 2001). Accordingly, Maslach et al. (2001) argue that a lack of appropriate rewards devaluates both the work and the workers. For this variable, three questions were added to questionnaire; one for each type of reward distinguished. The questions are stated as follows: *'I perceive my financial rewards as being sufficient for the work I do'*, *'I perceive my social rewards (e.g. appreciation, respect) as being sufficient for the work I do'* and *'I am proud of the work I do'*.

In addition, respondents were asked two questions that address the perceived feelings of community. The most important indicator for perceived feelings of community concerns social support. Accordingly, three types of social support can be distinguished, being social support from either co-workers, supervisors or family members (e.g. Maslach & Leiter, 2008), with the latter not being included in this research. As such, the respondents were asked to indicate the extent to which they agree or disagree with the following two statements: *'The overall quality of social interaction with co-workers allows me to work as a team'*, and *'I perceive the relationship with my supervisor as being respectful, close and of mutual support'*.

Next, respondents were asked to indicate the extent to which decisions at work are perceived as fair and equitable. Based on Maslach and Leiter (2008), the following statement regarding perceived fairness was included in the questionnaire: *'The balance between the input (e.g. time effort, and expertise) and output (e.g. rewards and recognition) is fair and equally distributed between me and my colleagues'*.

The last question addressing the situational variables concerns the personal and organisational values. When a conflict of values occurs at the job, workers will find themselves making a trade-off between the work they want to do and the work they have to do (Maslach & Leiter, 2008; see also Maslach et al., 2001). For this variable, the following statement was added to the questionnaire: *'I feel like I have to make a trade-off between the work I want to do and the work I have to do'*.

Burnout – engagement continuum characteristics

Evidently, the burnout – engagement continuum is a very relevant concept for this research. Previously, in Chapter 2, the individual constructs of burnout and engagement are elaborated and estimated. A questionnaire was constructed to determine the level of burnout (MBI) and engagement (UWES). Accordingly, the MBI-GS measures all three dimensions of the burnout – engagement continuum, being exhaustion – energy, cynicism – involvement and inefficacy – efficacy (Maslach & Leiter, 2008). Within this measurement, burnout is reflected in higher scores on exhaustion and cynicism and lower scores on efficacy, whereas the opposite pattern reflects greater engagement (Maslach & Leiter, 2008). Building on the original MBI, designed by Maslach and Jackson (1981a), the MBI-GS is a 16-item measure that assesses the burnout – engagement continuum among people in all occupations, rather than just the (human) services industries and, thus, is appropriate for employees within all types of organisations (Maslach & Leiter, 2008).

However, the use of this specific version of the intended MBI is restricted by copyrights. As a result, this research uses the *UBOS or Utrechtse Burnout Schaal* (e.g. Brenninkmeijer & VanYperen, 2003; Vanheule et al., 2012). For the purpose of this research, the UBOS-A (English: UBOS-GS), rather than the original UBOS, was used since this measurement is very similar to the MBI-GS. Accordingly, similar to the MBI-GS, burnout is reflected in higher scores on exhaustion and cynicism and lower scores on efficacy, whereas the opposite pattern reflects greater engagement. The privacy-sensitive character of asking respondents questions about their potential to burnout, however, is recognised. For the purpose of the questionnaire, therefore, some statements may be drafted reversely. The respondents were asked to indicate how often each statement applies to them by indicating the best matching number. A 7-point Likert scale was used ranging from 1 (never) to 7 (always). Table 4.4 shows an overview of the operationalisation of the burnout variables. For defining the burnout – engagement continuum variables, three different variables were distinguished. Accordingly, these variables were addressed by using fifteen different questions. To improve the transparency of Table 4.4, all statements have been bundled to its corresponding dimension. The sequence used in the questionnaire is indicated by (i.e.) ‘(1)’, while reversed-scored items are indicated by (R) (see also Appendix D).

Table 4.4: Operationalisation burnout characteristics

Variable	Indicator	Level of measurement	Item			
Exhaustion	Feeling emotionally drained (1) (R)	Ordinal	Multiple choice (5): 1 = Never 2 = Sporadic 3 = Occasionally 4 = Regularly 5 = Often 6 = Very often 7 = Always			
Energy	Feeling used up (11) (R)					
	Feeling fatigued (13) (R)					
	Working all day is a strain (3) (R)					
	Feeling burned out (5) (R)					
Cynicism	Enthusiastic (8) (R)	Ordinal				
Involvement	Cynical (14) (R)					
	Distant attitude (7) (R)					
	Question meaning and purpose (2) (R)					
Inefficacy	Dealing with problems effectively (4)	Ordinal				
Efficacy	Influencing work positively (6)					
	Feeling exhilarated (10)					
	Accomplishing worthwhile things (12)					
	Feeling confident about work (15)					
	Good at work (9)					
Never 1	Sporadic 2	Occasionally 3	Regularly 4	Often 5	Very often 6	Always 7
Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Daily

Knowledge workers activities

In Chapter 3, various types of activities were introduced that are commonly used in activity based work environments. According to Tabak (2009) and Appel-Meulenbroek et al. (2011), among others, the activities can differ based on the level of concentration needed to conduct the activity and whether they are formal or informal of nature. Subsequently, Leesman (2017) identified the twenty-one most important activities conducted by knowledge workers, of which an overview of the top ten can be found in Table 3.3 (Section 3.3.1). Berg (2017), however, argued that *concentration work* (e.g. individual focused work, reading, (creative) thinking), *informal interactions* (e.g. informal meetings, relaxing) and *formal interactions* (e.g. planned meetings, collaborating) are the most dominant activities in the literature.

Subsequently, this set-up was used during this research since it covers a broader range of contemporary knowledge worker activities. For this section of the questionnaire, respondents were asked to indicate the extent to which they consider the activities important. A 5-point Likert scale was used ranging from 1 (not important) to 5 (very important). Table 4.5 shows an overview of the operationalisation of the activity variables.

Table 4.5: Operationalisation activities

Variable	Indicator	Level of measurement	Item
Activities	Concentration work (e.g. individual focused work, reading, (creative) thinking)	Ordinal	Multiple choice (5): 1 = Not important 2 = Slightly important 3 = Neutral 4 = Important 5 = Very important
	Informal interactions (e.g. informal meetings, relaxing, taking a break)	Ordinal	
	Formal interactions (e.g. planned meetings, collaborating)	Ordinal	

Physical workplace characteristics

This section shows an overview of the operationalisation of the physical workplace characteristics. For defining the physical workplace characteristics of respondents, a number of different variables were distinguished to address the office layout, office comfort, information and communication, office use and office location. Accordingly, this part of the questionnaire measures the extent to which respondents agree or disagree with statements that are related to the physical workplace characteristics of the activity based office workstyle. Besides, questions were added in which respondents were asked to indicate how often they used a specific set of 'rules' that is associated with the activity based office concept. Table 4.6 shows an overview of the operationalisation of the physical workplace characteristics. The following section will elaborate on each of the specific physical workplace variables (e.g. office layout, office comfort, etc.).

Table 4.6: Operationalisation physical workplace characteristics

Variable	Indicator	Level of measurement	Item
Office layout	Workspace variety	Ordinal	Multiple choice (5): 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
	Workspace availability		
	Workspace openness		
	Distance between workspaces		
	Facilities		
Office comfort	Ambient factors	Ordinal	Multiple choice (5): 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
	Ergonomics		
	Overall comfort		
ICT	ICT-services	Ordinal	Multiple choice (5): 1 = Never

			2 = sometimes 3 = About half the time 4 = Often 5 = Always
Office use	Desk-switching (switching) Desk-sharing (claiming) Interaction Distraction Noise Privacy	Ordinal	Multiple choice (5): 1 = Never 2 = sometimes 3 = About half the time 4 = Often 5 = Always
Office location	Telework	Ordinal	Multiple choice (5): 1 = Never 2 = sometimes 3 = About half the time 4 = Often 5 = Always

Office layout

In the part of the questionnaire that addresses the office layout characteristics, respondents were asked to indicate the extent to which they agree or disagree with the corresponding statements, by using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example of a statement included in the questionnaire is: *'The variety of workspaces allows me to choose the workspace that best fits the activity'*. Table 4.7 shows an overview of the operationalisation of the office layout characteristics.

Table 4.7: Operationalisation office layout characteristics

Variable	Indicator	Level of measurement	Item
Workspace variety	Choose the best workspace	Ordinal	
Workspace availability	Suitable workspace	Ordinal	Multiple choice (5): 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
Workspace openness	Openness, transparency Movement	Ordinal	
Distance between workspaces	Spatial design Workspace allocation Distraction	Ordinal	
Facilities	Facilities	Ordinal	

Office comfort

In the part of questionnaire that addresses the office comfort characteristics, respondents were asked to indicate the extent to which they consider the corresponding characteristics comfortable. A 5-point Likert scale was used ranging from 1 (very uncomfortable) to 5 (very comfortable). Table 4.8 shows an overview of the operationalisation of the office layout characteristics.

Table 4.8: Operationalisation office comfort characteristics

Variable	Indicator	Level of measurement	Item
Ambient factors	Temperature Heating Ventilation Lighting Air quality Personal control	Ordinal	Multiple choice (5): 1 = Very uncomfortable 2 = Uncomfortable 3 = Neutral 4 = Comfortable 5 = Very comfortable
Ergonomics	Ergonomic office chairs Adjustable office desks Overall ergonomic furniture	Ordinal	
Overall comfort	Overall comfort	Ordinal	

Information and communication technology, office use and office location

The next part of the questionnaire combines characteristics regarding information and communication technology, office use and office location characteristics. On the one hand, this is done since the information and communication technology- and office location components include only few variables. On the other hand, all components correspond with a specific set of ABW rules. Accordingly, in Chapter 2, it has been elaborated the activity based office concept is based on a set of rules. As such, this section of the questionnaire addresses rules that are associated with information and communication technology-, office use- and office location characteristics. An example of a statement that is included in the questionnaire is ‘*I clear out the workspace if I am away for more than 15 minutes*’. The respondents were asked to indicate to which extent they follow these rules. A 5-point Likert scale was used ranging from 1 (never) to 5 (always). Table 4.9 shows an overview of the operationalisation of the office use and office location characteristics.

Table 4.9: Operationalisation information and communication technology, office use and office location characteristics

Variable	Indicator	Level of measurement	Item
ICT-services	Cloud computing Mobile tools (i.e.) Intranet	Ordinal	Multiple choice (5): 1 = Never 2 = sometimes 3 = About half the time 4 = Often 5 = Always
Desk-switching	Choosing best workspace Clearing out workspace	Ordinal	
Desk-sharing	Leaving workspace to its original set-up Claiming workspaces	Ordinal	
Interaction	Social interactions Work-related interactions	Ordinal	
Distraction	Interruptions Crowding		
Noise	Excessive noise	Ordinal	
Privacy	Isolating from colleagues		
Telework	Working at home Working in between home and work	Ordinal	

4.2. Procedure of data collection

For this research, the quantitative data has been collected by means of an online questionnaire for which a bilingual link was distributed. Both versions of the questionnaire (i.e. English and Dutch) can be found in Appendix C.

The questionnaire was distributed online between July 10th and September 4th. For efficiency reasons, this eight-week holiday period was preferred over a potential delay in the graduation process by starting in September. In general, contact has been established with corporate real estate managers, facility-managers and human resource managers of multiple organisations after which they were asked to participate in this study by distributing the questionnaire to knowledge workers within their organisation. Since vocal explanation was not possible, the questionnaire contains the necessary information towards the content and goals of the survey. A reminder (e.g. digital, or personal phone call) was sent to all potential participants a few weeks after the first contact had been established. In addition, all participating organisations received a notification regarding the closing date approximately one week before September 4th.

It is not exactly clear how many people noticed or received the questionnaire, or whether or not organisations have distributed the questionnaire among all employees (e.g. they might have made a pre-selection). Nevertheless, it can be concluded that both links were used 479 times of which the majority used the Dutch link (368 times). In total, 222 respondents filled in the questionnaire. The Dutch version was filled in 209 times, while the English versions was filled in 13 times. After the data preparation, a total of 184 completed questionnaires remained for continuing this study.

4.2.1. Reliability

Reliability concerns the extent to which the scales can be interpreted consistently across different situations (Field, 2009). Moreover, it measures the extent to which the data is free of random errors (e.g. Baarda et al., 2014). The reliability is measured by means of the Cronbach's Alpha for which a value of at least .7 is considered acceptable (Field, 2009). Random errors can occur in any situation. For example, respondents might be influenced by their mood, workplace distractions (e.g. noise) or personal issues/circumstances, when filling in the questionnaire. This might be the case for some questions addressing the burnout – engagement continuum. In section 4.2.1., it has already been mentioned that the privacy-sensitive character of asking respondents questions about their potential to burnout is recognised. However, the reliability of the data concerning the burnout – engagement continuum is expected to be high, since the statements are based on the UBOS-GS (Dutch: UBOS-A). Overall, it was made sure that the questions and statements included in the questionnaire were not that difficult to answer, which has been acknowledged by various respondents that provided feedback. The random errors that might occur in the data, therefore, are limited.

4.2.2. Validity

Validity concerns the extent to which the instrument, or measurement, actually measures what it sets out to measure (Field, 2009). Moreover, it measures the extent to which the data is free of systematic errors (Molin, 2014). In general, two types of validity can be distinguished; the internal validity and the external validity.

Internal validity

In order to secure a high internal validity, all variables included in the questionnaire were operationalised in the most logic and clear way. This way, respondents are most likely able to interpret and understand the questions and statements and data is gathered as intended. Besides, the questionnaire has been constructed in a way that it maximises the willingness to respond. Again, the privacy-sensitive character of asking respondents questions about their potential to burnout is recognised. The questionnaire, therefore, starts with some simple work-related control variables such as job rank and work experience, followed by the knowledge worker activities. Statements concerning personality and burnout were placed in between the work-related variables and workplace characteristics. The questionnaire concludes with some simple demographic control variables such as age, gender and level of education. If possible, statements were adopted from existing questionnaires. This was, among others, the case for statement concerning the burnout – engagement continuum (e.g. Maslach & Jackson, 1981a; Brenninkmeijer & VanYperen, 2003; Vanheule et al., 2012), knowledge worker activities (e.g. Leesman, 2017; Berg, 2017) and personality (Rammstedt & John, 2007). Section 4.2.1. elaborates on the content of these questions. The operationalisation and scale of these questions are generally accepted and used by academics worldwide. The section of the questionnaire in which respondents were asked to indicate the personal expectations towards their work might be difficult to understand. For such questions, explanatory text was added in order to secure a high internal validity. Besides, as Chapter 5 will point out, factor analysis will be conducted to test whether the data is sufficiently consistent.

External validity

The results of the sample group have to be representative for the target population. This is called the representativeness of a research. This research focusses on activity based office environments. Accordingly, the questionnaire is distributed among people that work at an office building using the activity based office concept. Although organisations might adapt different forms of activity based working, the idea behind the concept itself is similar across organisations. Besides, the sample group

is represented by knowledge workers only, which mostly occupy these offices. In line with this, statements concerning their activities involve knowledge worker activities only. So in conclusion, with the target population being knowledge workers in activity based offices, the results of the sample group should be more generally valid for these types of offices.

4.3. Data description and statistical analysis

For this research, the quantitative data has been collected by means of an online questionnaire for which a bilingual link was distributed. Before the data can be described in a detailed manner, the data has to be prepared, for which missing values are examined and, if necessary, deleted from the dataset. Besides, some variables (e.g. reversed items) of the remaining dataset have to be recoded.

The data description, then, starts with the socio-demographics and work-related variables. Both were used as control variables and besides the exploratory character, these values indicate the representativeness of the sample. For this matter, the data in this study is compared to the data of the Central Bureau for Statistics (short: CBS), who provide reliable statistic information about the Dutch society. To describe the data, frequency tables were used which calculated, among others, the frequencies, mean and standard deviation. A Chi-Square goodness-of-fit test was conducted to test whether the differences in proportion for the variables in this study were significant compared to the data provided by CBS. Age, however, was assessed by conducting a mean comparison between the age for this study and the data provided by CBS.

Data concerning the situational variables, burnout – engagement continuum, personality, and physical workplace characteristics are checked for internal consistency. Similar to the previous variables, the data was first described based on the frequencies, mean and standard deviation. Cronbach alpha's are then calculated to test the internal consistency of the scales. If scales have only two items (e.g. personality), the inter-item correlation is used to assess the internal consistency. If the coefficients exceed the threshold ($> .7$, [or $> .2$ for inter-item]), a new variable is created according to the following formula:

$$\text{New variable} = \frac{\sum \text{item scores}}{\text{number of items}}$$

In addition, factor analyses was used for data concerning the situational variables, so that the number of items can be reduced by combining them into new factors. For this matter, Principal Axis Factoring was used as extraction method, while Direct Oblimin with Kaiser normalisation was used as rotation method since correlations between the factors are expected. For conducting the factor analysis, no fixed numbers were set as input to find items that load on the same factors in an optimal way (e.g. Eigenvalue > 1). Bartlett's test of sphericity was also conducted. Before analysing the results, the suitability of the data was assessed. The correlation matrix was assessed for biases in terms of multicollinearity (shared variance: $> .8$) and singularity (perfect correlation: $= 1.00$).

4.3.1. Bivariate analysis

Bivariate analyses (e.g. bivariate correlations) were conducted between the dependent variables (e.g. BEC) and independent variables (e.g. office layout, situational variables, etc.) which were formed in Chapter 5. Accordingly, these bivariate analyses form the base for the final regression analyses. If the results may indicate that there are no significant correlations between the independent variables and the burnout – engagement continuum to begin with, performing a regression analyses will not yield any useful results. Moreover, bivariate correlations were calculated to exclude any variables that do not have a significant relationship with the BEC so that the practical relevance of the final analyses will be retained. It should be noted, however, that the analyses do not include partial regression. Instead,

the bivariate analyses merely indicate the relationship between two variables (e.g. Field, 2009). Regression analyses will be conducted to determine the final direction and strength of the effects between the dependent- and independent variables.

Various statistical tests were conducted to calculate the bivariate analyses. The tests depend on the level of measurement, sample size and distribution (parametric/non-parametric) among others. Below, each statistical test that was used for calculating the bivariate correlations is elaborated individually.

4.3.1.1. Parametric data

The large majority of data for this study is of parametric nature, indicating that the data is normally distributed (e.g. Field, 2009). For parametric data, the Pearson product-moment correlation coefficient (r) is calculated to test whether any significant correlations exist between the dependent- and independent variables.

Scatterplots are generated to be able to check for violations regarding linearity and homoscedasticity. The scatterplots also give an overview of the nature of the potential relationship between the variables. Next, the Pearson product-moment correlation coefficients (r) are calculated. A positive coefficient indicates that an increase for the score of one variable also implies an increase of the score for the other variable. A negative coefficient, on the other hand, indicates that an increase for the score of one variable implies a decrease of the score of the other variable. For assessing the strength of the variable, references are made to a study conducted by Vosters (2017), who used the following guidelines, based on Cohen (Cohen in Pallant, 2016): $r = .10$ to $.29$ (small), $r = .30$ to $.49$ (medium), and $r = .50$ to 1.0 (large). A significance level of 5% ($p < .05$) was used, indicating the significance of the results that are obtained.

4.3.1.2. Non-parametric tests

In the case that the standard requirements are not met (e.g. small sample, not normally distributed), non-parametric tests were used (e.g. Field, 2009). Accordingly, for the majority of non-parametric variables in this study, Spearman correlations are calculated to test whether any significant correlations exist between the dependent- and independent variables. Spearman correlation is the non-parametric alternative for the Pearson product-moment correlation coefficient (parametric test). Accordingly, the process of calculating the correlation coefficients is very similar to the Pearson correlation (see 4.3.1.1.).

The remaining non-parametric variables in this study (e.g. gender, nature of contract, etc.) are of nominal (>2 groups) or dichotomous nature. The potential relationships for these variables are tested by means of Mann-Whitney U. The Mann-Whitney U test calculates whether there is a difference between two independent samples (e.g. men and women) and an ordinal dependent variable. Similar to prior tests, the independent variables for this study consist of the burnout – engagement continuum dimensions. If the p-value is smaller or equal to $.05$, there is significant difference in mean scores for both groups. If so, it can be concluded that there is significant (bivariate) correlation between the dependent- and independent variables.

4.3.2. Regression analyses

Multiple regression analysis (MRA) was used to determine the effect of independent variables on the burnout – engagement continuum dimensions. When constructing a complex model (MRA) with several predictors, a great deal of care should be taken in selecting the predictors for the model, because the regression coefficients depend upon the variables in the model (Field, 2009). Accordingly, Field argues, the way in which the predictors are entered into the model can have a great impact. This

is especially important since the predictors are, most likely, correlated to each other as well. For this research, the standard multiple regression (Enter-method) is used. In standard MRA, all predictors are entered into the model simultaneously to evaluate them according to their predicting power (Field, 2009; Pallant, 2010). This method, however, comes with the danger of over-fitting the model, implying that the model contains too many variables that make little contribution to predicting the outcome (e.g. Field, 2009).

Regression analysis is a way of predicting an outcome variable (continuous) from one or several predictor variables, or independent variables (Field, 2009). Reasons for using multiple regression analyses, for example, are:

- *Exploring how well a set of variables is able to predict a particular outcome;*
- *Exploring which variable in a set of variables is the best predictor of an outcome; and*
- *Exploring whether a particular predictor variable is still able to predict an outcome when the effects of another variable are controlled for (partial regression) (Pallant, 2010).*

The standard formula for MRA is as follows (Field, 2009):

$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in} + \varepsilon_i$, in which:

Y_i = dependent variable i ;

β_0 = constant (intercept);

β_{i-n} = partial regression coefficient of independent variables;

X_{i-n} = independent variable i ;

ε_i = error term for dependent variable i .

Prior to exploring the relationships between the independent variables and the burnout – engagement continuum dimensions, a number of assumptions regarding the dataset have to be met, since they can violate the data and the results. This is especially important for generalising the conclusions based on the regression analyses. Berry (1993), Field (2009), and Pallant (2010), among many others authors, have reported extensively on MRA-assumptions, of which the most important ones are described below.

- **Sample size:** the issue with sample size is generalisability. Moreover, the number of cases in the MRA has to be sufficiently large to obtain results that can be generalised with other samples, hence the bigger the sample size, the better (Field, 2009). The estimate of R (and R^2) that results from regression analyses depends on the number of predictors and the sample size. Accordingly, small sample sizes may result in strong effects (R) in terms of Cohen's criteria (Cohen in Pallant, 2016; see also Field, 2009). A formula for calculating the required sample size was provided by Green (1991) and Tabachnick and Fidell (2007, p.123), who recommend a minimum sample size of $N = 50 + 8k$, in which k is the number of predictors (or independent variables). For instance, if one would be interested in performing a MRA to investigate the effect of the main variables (physical workplace characteristics) on the self-evaluation strain of the BEC, the minimum sample size has to be $50 + 8 \cdot 4 = 82$ cases, since four main variables were identified for having a significant relationship to the self-evaluation strain (see Chapter 6).
- **Multicollinearity and singularity:** both terms have been used and explained in prior chapters. The terms refer to the relationships between independent variables, which should not be correlating too high. Multicollinearity refers to shared variance ($>.8$) and singularity refers to perfect correlation ($=1.00$). To validate these assumptions, the variance inflation factor (VIF)

and tolerance (1/VIF) values are used. Field (2009) found several guidelines for applying these guidelines. All VIF-values should be smaller than 10, while the average VIF should not be substantially greater than 1 (Bowerman & O'Connell, 1990; Field, 2009). Tolerance values smaller than .1 indicate a serious problem, while tolerance below .2 indicates a potential problem (Menard, 1995, Field, 2009).

- **Outliers:** outliers are extreme scores (e.g. very high or very low scores) that substantially differ from the other scores. MRA is very sensitive to outliers (Pallant, 2010). A standard rule is that the values of the standardised residuals should range between – 3,3 and 3,3 (Tabachniks and Fidell, 2007, p.128; Field, 2009).
- **Normality, linearity, and homoscedasticity:** these assumptions refer to the distribution of residuals and the nature of the underlying relationship between variables (Pallant, 2010). Accordingly, Pallant argues that the residuals should be normally distributed (normality), should have a straight-line relationship with the predicted scores of the dependent variables (linearity), and should have the same variance for all predicted scores of the dependent variables (homoscedasticity) (Pallant, 2010). If the variances are very unequal, it is called heteroscedasticity (Field, 2009).

A great deal of care should be taken to avoid any violations of the assumptions, because they can affect the reliability of the results. As indicated in previous chapters, some of the variables were not normally distributed. Accordingly, the relationships between these variables and the dependent variables were tested by means of non-parametric tests (e.g. Spearman's correlations, Mann-Whitney U) (see Chapter 6).

4.4. Conclusions

This chapter initiated the process of answering sub question 3: What is the relationship between the physical environment and the burnout – engagement continuum? Literature research was conducted in order to find an answer to sub question 1 and 2, which has led to the construction of the conceptual model as can be found in Figure 3.2. Subsequently, this chapter outlined the approach of the research that is conducted to test such presumptions.

Prior to computing the questionnaire, these variables have been operationalised by indicating the variables, indicators, level of measurement, and items. In general, a 5-point Likert scale was used with the exception of the burnout – engagement continuum (7-point Likert scale). The questionnaire is distributed among knowledge workers across a variety of organisations in the Netherlands and provides the necessary data that is required to assess the presumptions. Besides, the reliability and validity (both internal and external) of the data were explained in this chapter (see also Chapter 5).

The final section of this chapter gave a preview of the statistical analyses that were used for analysing the data. More specifically, bivariate analyses, Pearson product-moment correlations, Spearman correlations, Mann-Whitney U tests, and multiple regression analyses were used for analysing the data in Chapters 5 and 6.

5. Data description

This chapter continues with the process of answering sub question 3: What is the relationship between the physical environment and the burnout – engagement continuum? This chapter, in particular, focuses on the data description. The data preparation is discussed first, in which missing values are examined and, if necessary, deleted from the dataset. In addition, this section discusses the variables that were recoded. After the data is prepared, the remaining data will be described extensively in section 2. The data description starts with the socio-demographic- and work-related characteristics, which are tested for representativeness when possible. The data description, then, continues with the variables addressing the burnout – engagement continuum, physical workplace characteristics and remaining control variables.

5.1. Data preparation

After downloading and converting the dataset, both versions had to be merged into one dataset and translated into English. In addition, labels were added to the variables and the level of measurement (LoM) had to be transformed into the correct scales.

Before the analyses could be conducted, however, the raw data had to be prepared by transforming, recoding, and excluding some (missing) variables. For this matter, a Logbook and Codebook were generated, which can be found in Appendix E. After the data preparation, a total of 184 completed questionnaires remained for continuing this study. Below, the data-preparation will be elaborated in a more detailed manner.

5.1.1. Missing values

First, the database was screened for missing values. Not all 222 questionnaires were fully completed, with some respondents dropping out after particular questions. The cases that include missing values are discussed below.

- As mentioned before, 479 potential respondents found their way to the questionnaire. Although this seems to be a large amount for a holiday period, only 222 of these actually started filling in the questionnaire. The 257 potential respondents, from now on referred to as ‘no score’, are not taken into account. The large amount of ‘no scores’ can, most likely, be explained by the fact that it was a holiday period with very low building occupancy rates.
- In 38 cases, respondents dropped out of the questionnaire after particular questions. The reasons for dropping out early are not exactly clear on an individual level, but might include completion time, the ‘personal’ character of some questions (e.g. personality), or the content not being as expected. These cases cannot be taken into account since far too many values are missing for answering the research (sub)questions accurately.
 - In ten cases, respondents dropped out before or during questions regarding personality (question 10/19). These cases cannot be taken into account since the main statements regarding the BEC and physical workplace characteristics are missing. Earlier on this research, it has been argued that the privacy-sensitive character of asking respondents questions about their personality, as well as their potential to burnout, has been recognised. Accordingly, the BFI-10 was used to test personality in an attempt to minimise the amount of respondents dropping out;
 - In six cases, respondents dropped out before or during questions regarding the organisational risk factors, or situational variables (question 11/19). These cases cannot be taken into account when continuing this research since the main questions

regarding the burnout – engagement continuum and physical workplace characteristics are missing;

- In nine cases, respondents dropped out before or during statements regarding the main questions addressing the burnout – engagement continuum (question 12/19). These cases cannot be taken into account since far too many information is missing to accurately answer the research (sub)questions. However, it was already expected that the inclusion of these questions might trigger some resistance. Accordingly, the well-known UBOS-GS was used to indicate the corresponding questions (see also Section 4.2.1.);
- In eight cases, respondents dropped out before or during questions regarding the physical workplace characteristics, being the office layout, office comfort, ICT, office use, and office location (question 13/19 – 14/19 – 15/19). These cases cannot be taken into account since too many information is missing to answer the research (sub)questions accurately.
- In five cases, respondents dropped out before or during other questions including the knowledge worker activities (two cases, question 9/19), job rank (one case, question 1/19), and demographic questions (two cases, question 16 to 19).

5.1.2. Recoding

After deleting the cases that include missing values, a total of 184 completed questionnaires remained to be used to continue this study. Next, some variables of the remaining dataset had to be recoded.

For privacy reasons, respondents were asked to indicate their year of birth, rather than date of birth. This variable, however, needs to be recoded into an age-variable. Not all respondents answered this question in a uniform manner. Accordingly, four respondents indicated their current age, rather than their year of birth. These value, being '27', '30', '35', and '44' had to be recoded into the correct year of birth, being respectively '1991', '1988', '1983', and '1974'. One respondent answered '93', which was most likely referring to the birth year '1993'. The respondents' answer was recoded accordingly. In addition, two respondents indicated that their year of birth were '1192' and '1897', which most likely refer to the birth year '1992' and '1997', respectively. These values were recoded accordingly. Two respondents indicated that their year of birth was '1900' and '2018'. After studying their demographic data, it has been decided that these two values cannot be recoded into any other year of birth, and therefore were recoded into missing values.

By using the date and time wizard in SPSS, dates can then be extracted from each other. Since the respondents were not asked to indicate their date of birth, the form-date (or extraction-date) was set on June 1st. This date was chosen since it was the closest month before the link was distributed (being July). Subsequently, SPSS was able to transform the year-of-birth variable into an age-variable.

Job rank was assessed using five general and predetermined job positions supplemented with the option 'other'. The latter was used twelve times, for which some of the answers were recoded into one of the original five answer options. Two respondents indicated their job rank as 'supervisors', which were both recoded into the original value 'manager'. Another two respondents indicated their job rank as 'owner'. Although it is possible for owners of large companies to be just stakeholders, rather than board members, both values were recoded into the original value 'board member'.

Work experience was assessed in terms of years of employment at their current employer and the number of employers respondents have worked for in their professional career. For the latter, three respondents indicated that they have worked for zero employers. This might be explained by the fact that these respondents are interns or have just started their professional career after graduating. Nevertheless, the current organisations can be assessed as their first employer. Accordingly, those cases were recoded into '1'. In addition, one respondent indicated to have worked

for 25 employers. This person might be a consultant or a freelancer who has been working for various employers and organisations. To avoid outliers, this value has been recoded into the mean number of employers indicated by other respondents of the same age. Throughout the dataset, four respondents had the same age, with an average amount of two employers. Accordingly, this value has been recoded into '2'.

Respondents' highest degree of education was assessed using five different education levels. For representativeness reasons, these levels had to be recoded into a new variable with three education levels. For this matter, primary education and secondary education were combined and recoded into the new value low education. Vocational education was recoded into the new value medium education. Undergraduate- and postgraduate education, finally, were combined and recoded into the new value of high education.

Household composition was assessed using four general and predetermined household compositions supplemented with the option 'other'. The latter was used seven times, for which some of the answers were recoded into one of the original four answer options. One respondent indicated that he/she is in a relation. Accordingly, this value was recoded into the original value 'living together/married without (resident) children'. Other respondents indicated, among others, that they were living at home, share their home or that the question does not apply.

5.1.3. Reversed items

The final step for the data preparation is to recode any questions and statements that are formulated reversely or negatively. This is especially important for combining variables into a total score. Accordingly, these variables were recoded in a way that the scale is reversed and points in the same direction as the other questions. For reversed variables, references are made to the Codebook in Appendix E.

5.2. Data description

The following section describes the data. For this matter, a total amount of 184 cases are taken into account. This section elaborates on the results of the data indicated by the respondents. Each section of the questionnaire will be explained below in a more detailed manner.

5.2.1. Socio-demographic characteristics

First, the data concerning the socio-demographics are explained. Besides the exploratory character, these values also indicate the representativeness of the sample. For this matter, the data in this study is compared to the data of the Central Bureau for Statistics (short: CBS), who provide reliable statistic information about the Dutch society. If provided, data from 2018 representing the Dutch population within the labour force is used. If not, the available data from 2017 is used. Notably, however, CBS does not provide specific information for knowledge workers. Instead, they provide information concerning the general Dutch working population.

Gender

Table 5.1. shows the frequencies and percentages of gender for this study. From the total amount of 184 respondents, 81 respondents are male and 103 respondents are female. This results in 44,0% being male and 56,0% being female.

Table 5.1: Distribution of gender

Distribution of Gender			CBS (2018b)
	N	%	%
Male	81	44,0	53,6
Female	103	56,0	46,4
Total	184	100	100

A Chi-Square goodness-of-fit test was computed to test whether the differences in proportion between males and females for this study were significant compared to the data provided by CBS. The results show that there is a significant difference ($\chi^2 (1, n = 184) = 6.787, p = .009$), indicating that the sample is not representative for the Dutch working population of the labour force because it has more females. Therefore, it should be noted to interpret the results of this study with care when generalising the results. The Chi-Square test is attached in Appendix F.

Age

Figure 5.1. and Figure 5.2. show the frequencies and distribution of age for this study. The figures includes 182 participants, since two cases were identified as missing values. Respondents in this study are aged between 20 and 66 years old with an average age of 43,7 years old.

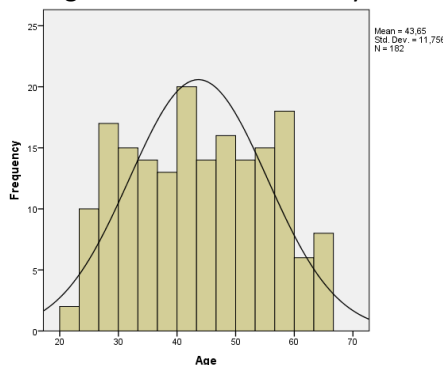


Figure 5.1: Distribution of age

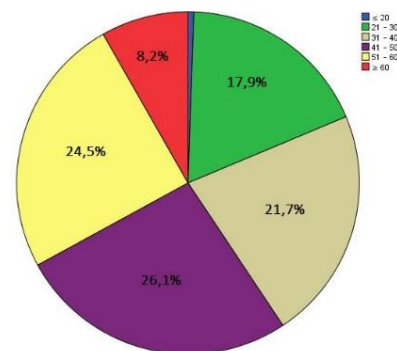


Figure 5.2: Distribution of age classes

The standard deviation of 11,76 is relatively high, which is a result of the widespread distribution of the age values indicated by the respondents. As can be seen in Figure 5.1, age 27 and 57 are relatively often present in the sample. The study, however, will continue as if the variable is normally distributed since it only concerns a control variable.

A One-Sample T-Test was computed to test whether the difference in mean age for this study was significant compared to the data provided by CBS (2014, 2018a) (e.g. mean = 42,14 years old). The results show that there is no significant difference ($n = 182, p = .077$), indicating that the sample shows a high representativeness for the Dutch working population of the labour force. The T-Test is attached in Appendix F.

Education level

Respondents' highest degree of education was assessed using five different education levels. Table 5.2 shows the frequencies and distribution for the corresponding education levels. It has already been mentioned that the primary education variable was recoded into a new education variable in which the different education levels were reduced from five to three distribution values (see also Section 5.2.2.). In Table 5.2, the new education variable is referred to as 'Recoded Education level'.

Table 5.2 shows that the majority of respondents (77,7%) is highly educated (i.e. University Bachelor level or University Master level or PhD). A total amount of 15,2% (28 respondents) attended medium level education (i.e. vocational education). Only 13 respondents (7,1%) indicated to have

finished secondary education (i.e. high school), while none of the respondents stopped their educational career after primary school (i.e. elementary education).

Table 5.2: Distribution of education level

Original Education level			Recoded Education level			CBS (2018d)
	N	%		N	%	%
Primary education (i.e. elementary school)	0	0	Low level education	13	7,1	20,7
Secondary education (i.e. high school)	13	7,1				
Vocational education	28	15,2	Medium level education	28	15,2	42,3
Undergraduate (University Bachelor level)	102	55,4	High level education	143	77,7	37,0
Postgraduate (University Master level or PhD)	41	22,3				
Total	184	100,0	Total	184	100,0	100,0

A Chi-Square goodness-of-fit test was computed to test whether the differences in proportion between the education levels in this study were significant compared to the data provided by CBS. For the Chi-Square test, the recoded values were used. The results show that there is a significant difference ($\chi^2 (2, n = 184) = 130.877, p = .000$), indicating that the sample is not representative for the Dutch working population of the labour force because the sample has a high education level. Therefore, it should be noted to interpret the results of this study with care when generalising the results. The Chi-Square test is attached in Appendix F. The lack of representativeness is, most likely, a direct results of a distributional restriction since the study focuses on knowledge workers, rather than the general working population within the Dutch labour force.

Household composition

Table 5.3. shows the frequencies and distribution of household compositions for this study. This variable was assessed using four general and predetermined households compositions supplemented with the option 'other'.

Table 5.3: Distribution of household compositions

Household composition			CBS (2018c)
	N	%	%
Living together/married without (resident) children	59	32,1	32,2
Living together/married with (resident) children	82	44,6	30,7
Single without (resident) children	35	19,0	29,0
Single with (resident) children	2	1,1	5,5
Other, namely:	6	3,3	2,5
Total	184	100,0	100,0

As can be seen in Table 5.3, by far the smallest group in this study consists of singles with (resident) children (1,1%). Singles without (resident) children (19,0%) and respondents who are living together/married without (resident) children (32,1%) are both largely present in the study sample. The largest group in this study, with 44,6%, consists of respondents who are living together/married with (resident) children. Six respondents (3,3%) indicated that they did not identify themselves with

any pre-given household composition, by filling in 'other'. They indicated that they are either living at home (with their parents), sharing their home or that the question 'does not apply'.

A Chi-Square goodness-of-fit test was computed to test whether the differences in proportion between the households in this study were significant compared to the data provided by CBS. The results show that there is a significant difference ($\chi^2(4, n = 184) = 24.757, p = .000$), indicating that the sample is not representative for the Dutch working population of the labour force because the sample includes more 'couples' and less singles. Therefore, it should be noted to interpret the results of this study with care when generalising the results. The Chi-Square test is attached in Appendix F. The lack of representativeness can be explained by the fact that the sample contains many respondents that are living together or are married with (resident) children, whereas the sample contains relatively few respondents that are single without (resident) children.

5.2.2. Work-related characteristics

Next, the data concerning the work-related characteristics are explained. Besides the exploratory character, these values also indicate the representativeness of the sample. Throughout the questionnaire, the work-related characteristics have been assessed by four variables with a total of eight indicators.

Work experience

Throughout the questionnaire, work experience has been assessed in terms of years of employment at their current employer and the number of employers respondents have worked for in their professional career. Figure 5.3 shows the frequencies and distribution of the years of employment for this study. Respondents could indicate zero ('0') if they have not completed one year at their current employer yet.

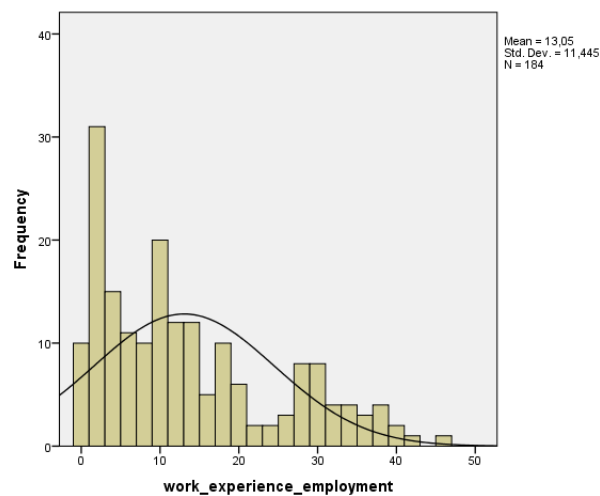


Figure 5.3: Distribution of years of employment

As can be seen in Figure 5.3, work experience among the respondents varies from zero to 46 years. On average, respondents have worked for 13,1 years with a standard deviation of 11.4 years. Evidently, 52,7% of the respondents indicated that they have yet to fulfil 10 years of employment, while 28,8% indicated to have fulfilled three or less years at their current employer. Although the sample contains many unexperienced employees, it may be concluded that the study sample in general is quite experienced. In total, 22,8% of the respondents even indicating that they have worked for at least 20 years at the same employer. The single most experienced respondent indicated to have worked for over 46 years at the current employer.

For the second part of this variable (work experience), respondents were asked to indicate the number of employers they have worked for in their professional career. Figure 5.4 and Table 5.4 show the frequencies and distribution of the number of employers for this study.

Table 5.4: Distribution of number of employers

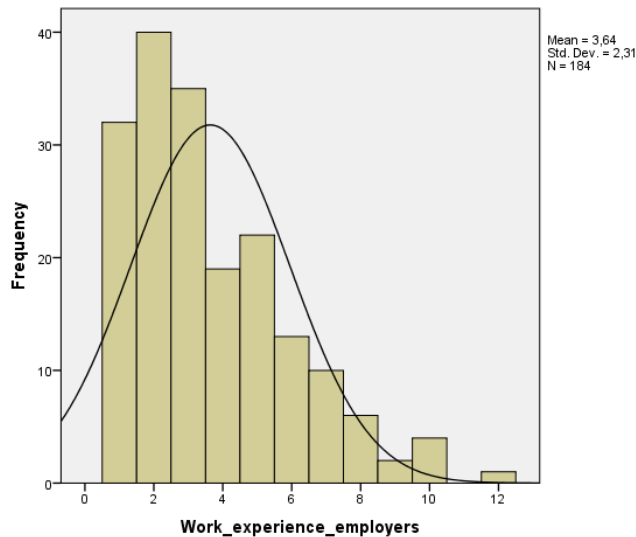


Figure 5.4: Distribution of years of employers

Work experience employers		
	Frequency	Percent
1	32	17,4
2	40	21,7
3	35	19,0
4	19	10,3
5	22	12,0
6	13	7,1
7	10	5,4
8	6	3,3
9	2	1,1
10	4	2,2
12	1	,5
Total	184	100,0

As can be seen in Figure 5.4 and Table 5.4, the number of employers ranges from one to twelve. On average, respondents have worked for 3,6 employers during their professional career with a standard deviation of 2.31. Notably, 58,8% of the respondents indicated to have worked for three or less employers, while 80,4% of the respondents indicated to have worked for no more than five employers. This might be explained by the fact that the average age among the study sample is relatively high. While the trend of switching jobs is increasingly becoming popular among young urban professionals, older generations appear to be more loyal.

Job rank

Table 5.5. shows the frequencies and distribution of job ranks for this study. Job rank was assessed using five general and predetermined job positions supplemented with the option 'other'. Notably, from a total sample of 184 respondents, the values intern/trainee and administrator were only indicated once (2 respondents, 0.5% per value). Also, board member (2,7%) was indicated merely five times. Most respondents, by far, identify themselves for being a regular employee (71,2%), which is not that surprisingly since they are increasingly recognised for being the most value assets in an organisation. On the contrary, it is surprisingly, to say the least, that one out of five respondents identify themselves as a manager / supervisor (20,7%). Most likely, this is a direct result of the way the questionnaire was distributed. In general, contact was established with corporate real estate managers, facility- or human resource managers.

In some cases, these managers declined the request for further distribution but were willing to participate themselves. A total of eight respondents (4,3%) indicated that they did not identify themselves with any pre-given job rank, by filling in 'other'. Their indicated job ranks vary considerably (e.g. 'advisor', 'consultant', 'contractor', 'controller', 'management supporter' and 'specialist facility, safety & security').

Table 5.5: Distribution of job ranks

Original Job rank			Recoded Job rank		
	N	%		N	%
Intern / trainee	1	,5	Regular employee	141	76,6
Administrator	1	,5			
Regular employee	131	71,2			
Manager / Supervisor	38	20,7	Manager / Supervisor	43	23,4
Board member	5	2,7			
Other, namely:	8	4,3			
Total	184	100,0		184	100,0

With the intended final analysis being a regression analysis, the current division for job ranks would result in dummy variables. Besides, only 8,1% of the respondents indicated to not identify themselves for being either a 'regular employee' or 'manager/supervisor'. Therefore, it was decided to recode the original variable 'job rank', thereby transforming all values into either 'regular employee' or 'manager/supervisor'. This resulted in 141 respondents being a regular employee (76,6%) and 43 respondents being a manager/supervisor (23,4%).

Contract

Throughout the questionnaire, contract has been assessed in terms of the personal contractual situation (e.g. permanent- or temporary contract), average amount of workhours per week and average amount of workhours per week spent at the office. Table 5.6 shows the frequencies and distribution of respondents' contractual situation for this study. From the total amount of 184 respondents, 166 respondents (90,2%) have an indefinite contract and 18 respondents have a temporary contract (9,8%). The standard deviation is 0,298.

Table 5.6: Distribution of respondents' contractual situation

Contract nature		
	N	%
Permanent contract (indefinite contract)	166	90,2
Temporary contract	18	9,8
Total	184	100,0

The latter two variables that were used as indicators for contract, indicate the average workhours per week, and how much time respondents use the possibility to telework (if possible at all). Table 5.7 shows the frequencies and distribution of the average workhours per week for this study. The average workhours ranges from 20 to 60 hours per week, with a mean value of 37,48 hours and a standard deviation of 6,42 hours. As expected with 166 permanent contracts, the majority of respondents have indicated to work either 32, 36 or 40 hours per week on average. A small minority of 10,2% has indicated to work beyond full-time (e.g. >40 hours), while respondents with a temporary contract have indicated to work either 20, 24, 28 or 30 hours per week on average.

Table 5.8 shows the frequencies and distribution of the average workhours per week at the office for this study. In order to be able to get a better understanding of the meaning of this variable, the original variable was transformed into a new variable indicating the average workhours per week away from the office, rather than at the office, which is more in line with the definition of teleworking (see also Section 3.2).

Table 5.7: Distribution of average workhours per week

Contract workhours		
	N	%
20	2	1,1
24	6	3,3
28	8	4,3
30	2	1,1
32	35	19,0
35	1	,5
36	27	14,7
38	2	1,1
40	82	44,6
44	1	,5
45	6	3,3
46	1	,5
50	7	3,8
55	1	,5
60	3	1,6
Total	184	100,0

Table 5.8: Distribution of average workhours per week at the office and the average workhours per week away from the office

Original Contract telework (workhours at office)			Recoded Contract telework (workhours away from office)		
	N	%		N	%
8	4	2,2	0	87	47,3
16	1	,5	2	1	,5
18	1	,5	4	11	6,0
20	10	5,4	5	2	1,1
24	22	12,0	6	6	3,3
25	1	,5	8	42	22,8
26	2	1,1	9	2	1,1
27	1	,5	10	7	3,8
28	11	6,0	11	1	,5
30	10	5,4	12	4	2,2
32	49	26,6	15	3	1,6
35	5	2,7	16	5	2,7
36	16	8,7	18	2	1,1
38	2	1,1	20	3	1,6
40	47	25,5	24	3	1,6
45	2	1,1	25	1	,5
			30	1	,5
			32	2	1,1
			40	1	,5
Total	184	100,0	Total	184	100,0

As can be seen in Table 5.8, the majority of respondents indicated to never work outside the office. In other words, these respondents do not telework. One possible explanation for this might be that those respondents cannot telework due to their daily activities. It might also be possible that these respondents consciously choose to work at the office (e.g. to feel/share a sense of community). Notably, many respondents (22,8%) have indicated to telework one day (8 hours) per week. One respondent even indicated to telework five days a week (40 hours). On average, the respondents in this study telework 5,58 hours per week (mean value), with a standard deviation of 7,27 hours per week. The relatively high standard deviation can be explained by the wide range of teleworking hours (zero to 40 hours per week).

Expectations

The respondents' expectations toward their job have been assessed in terms of the nature of work and the likelihood of achieving success. In addition, the respondents were asked to indicate whether this expectation pattern had become true or not. For this study, it is especially interesting if respondents have indicated to have had (very) high expectations that did not come true. Table 5.9 shows the frequencies and distribution of the respondents' expectations pattern for this study.

Table 5.9: Distribution of expectations

Expectations		
	N	%
Very low expectations	0	0,0
Low expectations	5	2,7
Neutral expectations	61	33,2
High expectations	109	59,2
Very high expectations	9	4,9
Total	184	100,0

Table 5.10: Distribution of expectation results

Expectations result		
	N	%
Yes	157	85,3
No	27	14,7
Total	184	100,0

Notably, almost every respondent in the study sample indicated that they had at least neutral (or higher) expectations when starting their current job. The complete sample holds only five exceptions, consisting of respondents who had low expectations while nobody had very low expectations. By far the largest part of the respondents (59,2%) indicated to have had high expectations, while nine respondents had very high expectations. Many respondents (33,2%) also indicated to have had neutral expectations when starting their current job.

For the second part of this question, respondents were asked to indicate whether this expectation pattern had become true or not. Table 5.10 shows the frequencies and distribution of the expectation results for this study. Notably, the majority (85,3%) indicated that their expectation pattern had become true, while 27 respondents (14,7%) indicated that their expectation pattern had not become true. As indicated before, for this study it is especially interesting when respondents have indicated to have had (very) high expectations that did not come true. For this matter, a cross table was constructed in SPSS to find to the combinations present in the data sample.

Table 5.11: Cross Table expectations*results

Cross tabulation: Expectations * Expectations result			
Count			
		Expectations result	
		Yes	No
Expectations	Very low expectations	0	0
	Low expectations	1	4
	Neutral expectations	50	11
	High expectations	97	12
	Very high expectations	9	0
Total		157	27

As can be seen in Table 5.11, twelve respondents indicated to have had high expectations when starting their current job, but the expectation pattern did not become true. This specific combination might be an early predictor of burnout, especially with the exhaustion and cynicism components (see also Section 2.4). Notably, another fifteen respondents indicated that the expectation pattern had not become true. However, these respondents indicated that they have had low- or neutral expectations when starting their current job. So, the fact that their expectation pattern had not become true might be a positive thing as well. For this matter, it has been decided to transform this variable from an ordinal to a dichotomous variable. One item refers to the combination of (very) high expectations that did not come true, whereas the other item refers to all other combinations.

5.2.3. Personality

For assessing the personality of respondents, the BFI-10 (Big Five Inventory) was used (Rammstedt & John, 2007). Five variables were included in the questionnaire to represent the 'Big Five' personality characteristics, being 'extraversion', 'agreeableness', 'conscientiousness', 'neuroticism' and 'openness'. During the selection of the items for the BFI-10 (Big Five Inventory), Rammstedt and John (2007) made sure to represent each factor with both a high and a low pole, so that each BFI-10 scale would consist of one true-scored and one false-scored item.

As discussed in Section 5.2.3, variables that are formulated reversely or negatively have to be recoded so that the variables can be combined into a total score. Accordingly, the five reversed personality items were recoded in a way that the scale is reversed and points in the same direction as the other questions. In order to be able to give a detailed data description of respondents' personality traits, the variables have to be computed into five total scores indicating the respondents' sum score for the 'Big Five' Personality traits (see also Table 4.2).

The Cronbach's Alpha (α) was used to test the internal consistency of the scale, for which the coefficient should be at least .7 (Devellis, 2012). If the coefficient is larger than the threshold (of .7), the items can be summated into the corresponding personality trait. Since the Cronbach alpha coefficient can be quite small if there are less than ten items included in the scale, which is the case for these personality traits, the inter-item correlation (for homogeneity) is computed as well. This combination of statistical analyses for testing the internal consistency of personality is derived from a research conducted by Hartog (2015). According to Pallant (2010), the optimal inter-item correlation value ranges from .2 to .4. The inter-item correlation value should also not be too high ($> .8$), because that could trigger a problem with multicollinearity. Table 5.12 shows the results for the internal consistency of the personality traits in terms of the Cronbach's alpha and the inter-item correlation (SPSS: reliability analysis).

Table 5.12: Internal consistency of personality traits

Personality trait	Cronbach's Alpha (α)	Inter-item correlation
Extraversion	.698	.536
Agreeableness	.398	.259
Conscientiousness	.574	.403
Neuroticism	.716	.654
Openness	.529	.373

As can be seen in Table 5.12, the Cronbach alpha coefficients for the personality traits are, indeed, quite small. The one exception is the personality trait 'neuroticism' which score just above the threshold of .7. The Cronbach alpha and inter-item correlation tests are attached in Appendix G. To validate these scores, a reference is made to the coefficients indicated in a research conducted by Gosling et al. (2003), who reported and accepted Cronbach alpha coefficients of .68 (extraversion), .40 (agreeableness), .50 (conscientiousness), .73 (neuroticism), and .45 (openness to experience). Notably, the scores in this study are very similar. They argued that *"these scales provide an example of how validity can exceed reliability"* in terms of Cronbach's alpha (Gosling et al., 2003). Besides, the relatively low coefficients were expected due to the small number of items included for each personality trait. In addition, the inter-item correlation coefficients of all personality traits are higher than the .2 threshold, indicating high homogeneity. So in conclusion, the coefficients are accepted, indicating that the ten items can be summated into the five main personality traits.

Next, the five personality traits were generated by computing (summing) each original- and recoded item of a specific personality trait. For this matter, a new form variable was constructed,

which then was transformed into the original scale ranging from 1 (strongly disagree) to 5 (strongly agree). Now, the data concerning respondents' personality can be described in a detailed manner.

Extraversion

First, the personality trait 'extraversion' was assessed, for which respondents were asked to indicate the extent to which they rather see themselves as being reserved, or as outgoing and sociable. Table 5.13 and Figure 5.5 show the frequencies and distribution of the extraversion personality trait for this study.

Table 5.13: Frequencies of extraversion personality trait

Sum personality extraversion		
	N	%
Strongly disagree	0	0,0
Disagree	11	6,0
Neutral	39	21,2
Agree	87	47,3
Strongly agree	47	25,5
Total	184	100,0

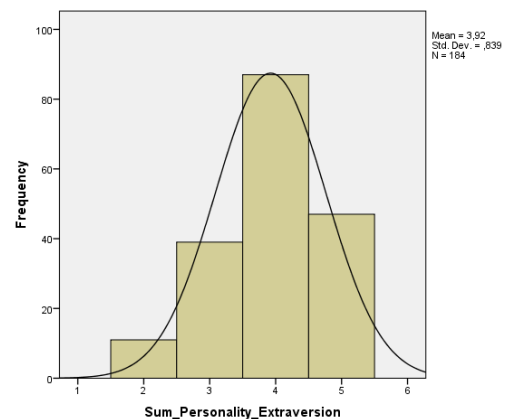


Figure 5.5: Distribution of extraversion personality trait

As can be seen in Table 5.13 and Figure 5.5, the majority of respondents see themselves as outgoing and sociable (72,8%), rather than reserved (6%). With a mean value of 3,92 and a standard deviation of .839, most respondents (strongly) agree with this personality trait. Notably, no respondents identify themselves for being strongly introverted, while a little over 20% indicated to be extravert nor introvert. Figure 5.5 shows that the extraversion variable is normally distributed.

Agreeableness

The second personality trait assessed was 'agreeableness', for which the respondents were asked to indicate the extent to which they rather see themselves as being generally trusting, or as someone who tends to find fault with others. Table 5.14 and Figure 5.6 show the frequencies and distribution of the agreeableness personality trait for this study.

Table 5.14: Frequencies of agreeableness personality trait

Sum personality agreeableness		
	N	%
Strongly disagree	0	0,0
Disagree	1	0,5
Neutral	14	7,6
Agree	100	54,3
Strongly agree	69	37,5
Total	184	100,0

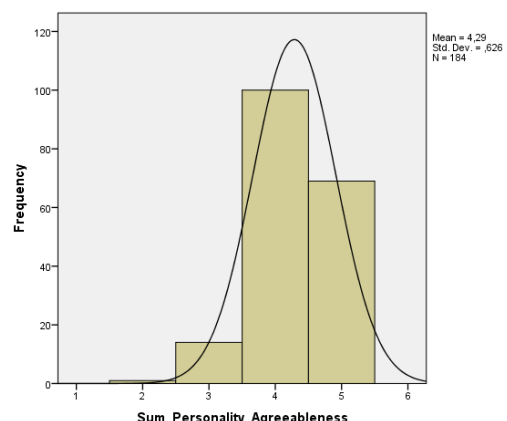


Figure 5.6: Distribution of agreeableness personality trait

As can be seen in Table 5.14 and Figure 5.6, the majority of respondents see themselves as generally trusting (91,8%), rather than seeking faults with others (.5%). With a mean value of 4,29 and a standard deviation of .626, most respondents (strongly) agree with this personality trait. Notably,

no respondents strongly disagreed with this personality trait, while 7.6% indicated to be neutral. Figure 5.6 shows that the agreeableness variable is normally distributed.

Conscientiousness

The third personality trait assessed was 'conscientiousness', for which the respondents were asked to indicate the extent to which they rather see themselves as someone who tends to be lazy, or as someone who does a thorough job. Table 5.15 and Figure 5.7 show the frequencies and distribution of the conscientiousness personality trait for this study.

Table 5.15: Frequencies of conscientiousness personality trait

Sum Personality Conscientiousness		
	N	%
Strongly disagree	0	0,0
Disagree	2	1,1
Neutral	13	7,1
Agree	83	45,1
Strongly agree	86	46,7
Total	184	100,0

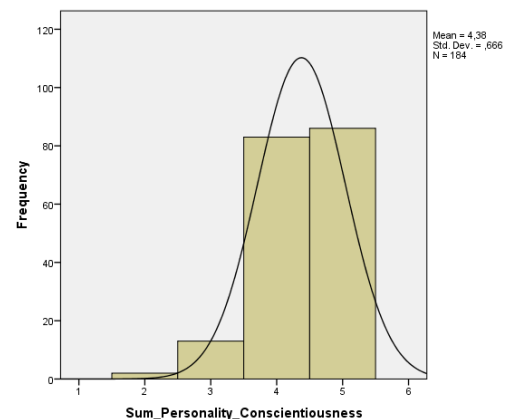


Figure 5.7: Distribution of conscientiousness personality trait

As can be seen in Table 5.15 and Figure 5.7, the majority of respondents identify themselves for doing a thorough job (91,8%), rather than being lazy (1.1%). With a mean value of 4,38 and a standard deviation of .666, most respondents (strongly) agree with this personality trait. Notably, no respondents strongly disagreed with this personality trait, while 7.1% indicated to be neutral. However, in this case, laziness can also refer to efficiency (e.g. striving for maximum result with minimum effort). Figure 5.7 shows that the conscientiousness variable is not normally distributed.

Neuroticism

The fourth personality trait assessed was 'neuroticism', for which the respondents were asked to indicate the extent to which they rather see themselves as someone who is relaxed and handles stress well, or as someone who gets nervous easily. Table 5.16 and Figure 5.8 show the frequencies and distribution of the neuroticism personality trait for this study.

Table 5.16: Frequencies of neuroticism personality trait

Sum Personality Neuroticism		
	N	%
Strongly disagree	21	11,4
Disagree	101	54,9
Neutral	50	27,2
Agree	12	6,5
Strongly agree	0	0,0
Total	184	100,0

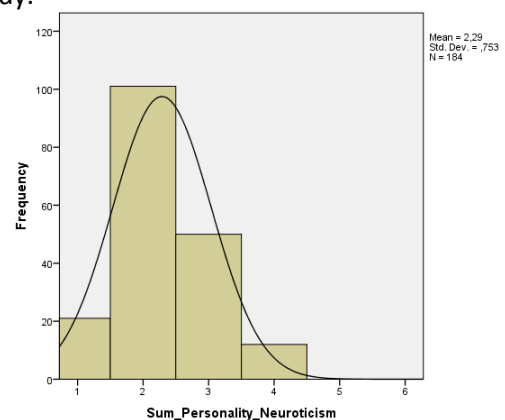


Figure 5.8: Distribution of neuroticism personality trait

As can be seen in Table 5.16 and Figure 5.8, the majority of respondents identify themselves for being relaxed and handling stressful situations well (66,3%), rather than being nervous easily

(6.5%). With a mean value of 2,29 and a standard deviation of .753, most respondents (strongly) agree with this personality trait. Notably, no respondents strongly disagreed with this personality trait, while 27,2% indicated to be neutral. It should be noted, however, that this personality trait is reversed relative to the other four personality traits. This is reflected by the fact the histogram is outlined to the left, rather than right. So, in this case, disagreeing to the neuroticism personality trait refers to being relaxed. Figure 5.8 shows that the neuroticism variable is normally distributed.

Openness to experience

The last personality trait assessed was 'openness', for which the respondents were asked to indicate the extent to which they rather see themselves as someone who has few artistic interests, or as someone who has an active imagination. Table 5.17 and Figure 5.9 show the frequencies and distribution of the openness personality trait for this study.

Table 5.17: Frequencies of openness personality trait

Sum Personality Openness		
	N	%
Strongly disagree	0	0,0
Disagree	13	7,1
Neutral	60	32,6
Agree	86	46,7
Strongly agree	25	13,6
Total	184	100,0

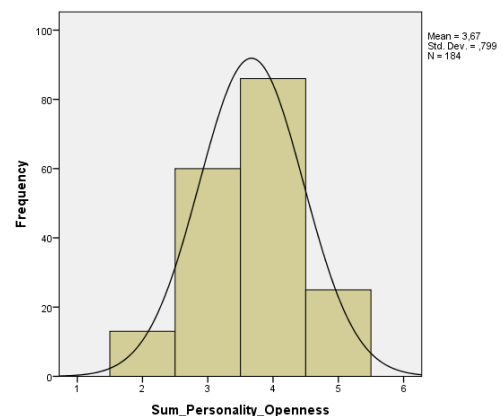


Figure 5.9: Distribution of openness personality trait

As can be seen in Table 5.17 and Figure 5.9, the majority of respondents identify themselves for having an active imagination (60,3%), rather than having few artistic interests (7.1%). With a mean value of 3,67 and a standard deviation of .799, most respondents (strongly) agree with this personality trait. Notably, no respondents strongly disagreed with this personality trait, while 32,6% indicated to be neutral. Figure 5.9 shows that the openness variable is normally distributed.

Conclusion

In conclusion, the respondents' personality was assessed by using the BFI-10 (Rammstedt & John, 2007). To test the internal consistency of the personality data, the Cronbach's alpha (α) and the inter-item correlation were used. The coefficients were sufficient to recode and compute all five personality variables. In general, respondents have indicated to identify themselves as being outgoing and sociable (mean = 3.92), generally trusting (mean = 4.29), relaxed, handles stress well (mean = 3.29), doing a thorough job (mean = 4.29) and having an active imagination (mean = 3,67).

5.2.4. Situational variables

Six variables were included in the questionnaire to address the situational variables. The situational variables include workload, control, rewards, community, fairness and values, and, together, these organisational risk factors encompass the six key domains of the workplace environment (Maslach et al., 2001; Maslach & Leiter, 2008). For each statement, respondents were asked to indicate the extent to which they agreed or disagreed with the statement on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Appendix H.1 and H.2 show the distribution and frequencies of the situational variables.

Notably, a massive amount of respondents (89,6%) indicated to (strongly) agree to the statement concerning intrinsic rewards. Besides, many respondents have indicated to perceive the amount of social rewards (65,2%) and financial rewards (62,5%) to be sufficient for the work they do. In other words, the majority of respondents feel respected, appreciated and proud of the work they do. In addition, respondents generally receive sufficient co-worker support (84,8%) and have sufficient authority (87,4%) and control (80,5%) to pursue the work in the most optimal way.

However, one out of four respondents does not perceive the relationship with their supervisor as respectful, close and of mutual support. This also reflects in the fact that only 56% of the respondents indicated to be able to actively participate in organisational decision-making. It is striking that 52,1% of the respondents think they have too much work to do, only 39,7% perceives the balance between the input (e.g. time, effort, expertise) and output (e.g. rewards and recognition) to be fair and equally distributed between colleagues and 33,7% believes they have to make a trade-off between the work they want to do and the work they have to do.

To structure the final analyses (Chapter 7), all variables that belong to a specific situational variable were combined and reduced into new variables. This method is similar to prior studies (e.g. Maslach & Leiter, 2008; Maslach et al., 2001) who reported Cronbach alpha's of .70 (workload), .70 (control), .82 (reward), .82 (community), .82 (fairness), and .74 (values). However, for this study it turns out that the internal consistencies (Cronbach's alpha) are too low, indicating that the eleven items cannot be combined and reduced into the six variables. Although the statements used for this study are derived from the Areas of Worklife Scale Measure (AWS), only 11 of the original 29 questions were used. As a result, the Cronbach alpha's declined to .634 (control), .540 (rewards), and .306 (community; inter-item: .187). Workload, fairness and values did not have to be tested for internal consistency since they were only addressed by one question each. This result might be explained by the fact that the combination of eleven statements used to address the situational variables is new and the scales have not been validated by means of prior studies yet. Therefore, factor analysis is computed to assess the internal consistency of the data and to reduce the number of variables.

Principal Axis Factoring was used as extraction method, while Direct Oblimin with Kaiser normalisation was used as rotation method since correlations between the factors are expected. For computing the factor analysis, no fixed numbers were set as input to find items that load on the same factors in an optimal way (e.g. Eigenvalue >1). Bartlett's test of sphericity was also computed. Before analysing the results, the suitability of the data was assessed. First, the correlation matrix was assessed for biases in terms of multicollinearity (shared variance: >.8) and singularity (perfect correlation: =1.00). No signs of multicollinearity and singularity were found in the correlation matrix, while the determinant is sufficiently large ($D = .120$). In addition, the Bartlett's test of sphericity is significant ($\text{Sig} = .000$) and the Kaiser-Meyer-Olkin measure is larger than the threshold of .6 (.672). The results of the factor analysis are shown in Table 5.18. To clarify the output table, it was extended with the label-column, Eigenvalues and explained variance per factor.

Table 5.18: Factor analysis for situational variables

Variable	Label	Factor			
		Recognition	Overload	Control	Appreciation
Sitvar_5	Sitvar_rewards_financial	,725	-,040	,069	-,083
Sitvar_10	Sitvar_fairness_input_output	,562	-,007	,121	-,037
Sitvar_6	Sitvar_rewards_social	,555	,114	-,077	,299
Sitvar_11	Sitvar_values_trade_off	-,110	,682	,098	-,017
Sitvar_1	Sitvar_workload_overload	,134	,600	-,056	-,001
Sitvar_3	Sitvar_control_authority	,060	,218	,738	-,005
Sitvar_2	Sitvar_control_control	,032	-,032	,519	,003
Sitvar_4	Sitvar_control_participation	,085	-,122	,507	,189
Sitvar_9	Sitvar_community_support_supervisors	,336	,121	-,117	,594
Sitvar_7	Sitvar_rewards_intrinsic	,004	-,174	,200	,444
Sitvar_8	Sitvar_community_support_coworkers	-,062	-,008	,048	,345
Eigenvalue		2,852	1,689	1,262	1,066
Explained variance (%)		25,92	15,36	11,48	9,70

Notably, reducing the number of items from the AWS from 29 to 11 resulted in a factor reduction from six to four. The remaining four factors all have an Eigenvalue higher than one. The table explaining the total variance, as well as the Screeplot are attached in appendix I. The screeplot, indeed, shows four changes in direction that did make the cut-off of Eigenvalue higher than 1. Besides, the Pattern Matrix clearly shows four factors with three, two, three and three items per factor respectively. The four factors and its corresponding items all have fairly clear descriptions. The study, therefore, continues with four factors explaining 62,46% of the total variance. As can be seen in Table 5.18, the majority of original variables have been combined into new factors. The factors were labelled ‘recognition’, ‘overload’, ‘control’, and ‘appreciation’. A more detailed explanation of each factor is given below. For computing the factors, however, it should be kept in mind that each item (partially) loads on all four factors, with some loadings bigger than others.

- Factor 1 is called recognition. Obviously, recognition and rewards are very similar. However, intrinsic rewards turned out to belong to a different factor, while the original ‘fairness’ indicator turned out to belong to the same factor. Thus, the recognition factor includes the items ‘financial rewards’, ‘social rewards’, and ‘balanced input vs. output’. Notably, the item ‘supervisor support’ is moderately correlated to this factor as well. However, this item is correlated strongly to the fourth factor and seems to have a better fit with this factor.
- Factor 2 is called ‘overload’ and is a more extensive factor of the original workload variable. As the name implies, this factor contains the original ‘workload’ item, but is extended with the ‘values’ variable which indicated whether respondents had to make a trade-off between the work they want to do and the they have to do. Notably, this is the only factor that contains two items.
- Factor 3 is called ‘control’ for obvious reasons. This factor is the only factor that contains all of the original ‘control’ items, being ‘control’, ‘authority’, and ‘participation’.
- Factor 4, finally, is called appreciation and is not to be confused with the ‘recognition’ factor. Whereas the ‘recognition’ factor focuses primarily on rewards for the work that is done, the ‘appreciation’ factor focuses on the social aspect of work. Moreover, this factor contains the items ‘social support from co-workers’, ‘social support from supervisors’, and ‘intrinsic rewards’. The first items originally belonged to the variable ‘community’, while the latter refers to being proud of the work you do.

Conclusion

In conclusion, it can be argued that the majority (89,6%) of respondents in this study sample is (very) proud of the work they do. However, over half of the sample population believes they have too much work to do (job overload) and have to make a trade-off between work they want to do and work they have to do (33,7%). For this study, eleven of the original 29 questions derived from the AWS were used, which resulted in Cronbach alpha's that were too low to combine and reduce the number of items into the six situational variables. This might be explained by the fact that the combination of eleven statements used to address the situational variables is new and the scales have not been validated by means of prior studies yet. Therefore, factor analysis (Principal Axis Factoring) was computed to assess the internal consistency of the data and to reduce the number of variables. Seemingly, the items of the original six situational variables, as used in this study, have a deeper meaning, since the factor analyses resulted in only four new factors explaining 62,46% of the total variance. The factors were labelled 'recognition', 'overload', 'control', and 'appreciation'. As a result, this study continues with four factors.

5.2.5. Burnout – engagement continuum

For addressing the burnout – engagement continuum, statements from the UBOS-A scale (English: UBOS-GS) were used. Accordingly, the statements were derived from research conducted by Brenninkmeijer and VanYperen (2003), and Vanheule et al. (2012). A total of 15 statements were included, for which five questions concern to the individual strain, four questions concern the interpersonal strain, and six questions concern the self-evaluation strain. Respondents were asked to indicate how often each statement applies to them by indicating the best matching number. A 7-point Likert scale was used ranging from 1 (never) to 7 (always). For the purpose of analyses in Chapter 7, statements addressing the burnout dimensions are considered reversed items, and are, therefore, recoded (see also Section 5.2.3.). This results in a new scale ranging from 1 (not engaged at all) to 7 (very engaged). Moreover, scores lower than 3 may indicate that respondents are sensitive to burnout, whereas scores higher than 3 may indicate that respondents tend to be engaged. Appendix J.1, J.2, and J.3 show the distribution of the burnout – engagement continuum variables per dimension.

According to the histograms in Appendix J, the mean scores of the data range from 4,76 to 6,33, referring to 'often to very often' on an 'engagement-scale'. Since nine items were recoded, the mean scores might also indicate 'sporadic to occasionally' in terms of a 'burnout-scale'. With a mean score of 6,33, respondents agree the most on statement 2 and 7, referring to "I am questioning the meaning and purpose of the work that I do" and "have developed a distant attitude towards my work". Notably, both statements concern reversed or recoded items. All except one item (e.g. statement 15) has a mean score higher than 5 (often). Statement 15, referring to "I am very confident about my work" has a mean score of 4,76 (regularly to often).

Ideally, all 15 variables can be reduced by means of combining them into the three corresponding dimensions. Although the existing UBOS-A scale was used, for which the scales have already been validated in prior research (e.g., Brenninkmeijer & VanYperen, 2003; Vanheule et al., 2012), Cronbach alpha coefficients were calculated to test the internal consistency before combining the variables into the three dimensions.

Individual strain

The first dimension assessed is the individual strain of exhaustion and energy, for which five statements were included in the questionnaire. The mean score ranges from 5,36 to 5,95 or from often to very often. Since the items included are all recoded, it should be noted that the respondents' answers originally range from 'sporadic' to 'occasionally'. The variable, label, mean and standard deviation for the items concerning the individual strain are shown in Table 5.19.

Table 5.19: Distribution of individual strain dimension

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted
Rec_BEC_1	Rec_BEC_EX_EN_emotionally_drained	5,36	1,01	0,720
Rec_BEC_3	Rec_BEC_EX_EN_working_all_day_strain	5,97	1,00	0,789
Rec_BEC_5	Rec_BEC_EX_EN_burned_out	5,95	0,97	0,736
Rec_BEC_11	Rec_BEC_EX_EN_feeling_used_up	5,70	0,99	0,702
Rec_BEC_13	Rec_BEC_EX_EN_fatigued	5,78	1,02	0,761
Sum score (N = 5)		5,75	1,00	
Cronbach's α (N = 5)		0,783		

As indicated before, the Cronbach alpha coefficient was calculated to test the internal consistency of the items. Table 5.19 shows that the Cronbach's alpha for the individual strain is .783, thereby exceeding the threshold of .7. This result validates the process of combining all five items into a new variable, called 'BEC individual'. Accordingly, this variable has a mean of 5,75 and a standard deviation of 1,00, indicating that the respondents in general are (very) energetic, rather than exhausted.

Interpersonal strain

The second dimension assessed is the interpersonal strain of cynicism and involvement, for which four statements were included in the questionnaire. The mean score ranges from 5,64 to 6,33 or from very often to always. With mean scores of 6,33, this dimension holds the two most agreed statements of the burnout – engagement continuum. Since the items included are all recoded, it should be noted that the respondents' answers originally range from 'never' to 'sporadic'. The variable, label, mean and standard deviation for the items concerning the individual strain are shown in Table 5.20.

Similar to the personal strain, the Cronbach alpha coefficient was calculated to test the internal consistency of the interpersonal strain. Table 5.20 shows that the Cronbach's alpha for the individual strain is .777, thereby exceeding the threshold of .7. This result validates the process of combining all four items into a new variable, called 'BEC Interpersonal'. Accordingly, this variable has a mean of 6,01 and a standard deviation of 1,06, indicating that the respondents in general are (very) involved, rather than cynical.

Table 5.20: Distribution of interpersonal strain dimension

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted
Rec_BEC_2	Rec_BEC_CY_IN_meaning_purpose	6,33	0,77	0,778
Rec_BEC_7	Rec_BEC_CY_IN_distant_attitude	6,33	0,88	0,713
Rec_BEC_8	Rec_BEC_CY_IN_enthusiastic	5,72	1,39	0,692
Rec_BEC_14	Rec_BEC_CY_IN_cynical	5,64	1,21	0,685
Sum score (N = 4)		6,01	1,06	
Cronbach's α (N = 4)		0,777		

Self-evaluation strain

The final dimension assessed is the self-evaluation strain of inefficacy and efficacy, for which six statements were included in the questionnaire. The mean score ranges from 4,76 to 5,55 or from often to very often. None of these items were recoded. This dimension holds the single most disagreed statement of the burnout – engagement continuum. The variable, label, mean and standard deviation for the items concerning the individual strain are shown in Table 5.21.

Table 5.21: Distribution of self-evaluation strain dimension

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted
BEC_4	BEC_IN_EF_dealing_w_problems_effectively	5,44	0,82	0,706
BEC_6	BEC_IN_EF_influencing_work_positively	5,28	0,98	0,659
BEC_9	BEC_IN_EF_good_at_work	5,65	0,78	0,707
BEC_10	BEC_IN_EF_exhilarated	5,56	1,08	0,759
BEC_12	BEC_IN_EF_accomplished_worthwhile_things	5,08	1,10	0,675
BEC_15	BEC_IN_EF_confident	4,76	1,13	0,715
Sum score (N = 6)		5,30	0,98	
Cronbach's α (N = 6)		0,742		

The Cronbach alpha coefficient was also calculated to test the internal consistency of the self-evaluation strain. Table 5.21 shows that the Cronbach's alpha for the self-evaluation strain is .742, thereby exceeding the threshold of .7. This result validates the process of combining all six items into a new variable, called 'BEC self-evaluation'. Accordingly, this variable has a mean of 5,30 and a standard deviation of 0,98, indicating that the respondents in general are (very) efficient, rather than inefficient.

5.2.6. Knowledge worker activities

The data concerning the knowledge worker activities is explained below. Throughout the questionnaire, the following activities were taken into account; *concentration work* (e.g. individual focused work, reading, (creative) thinking), *informal interactions* (e.g. informal meetings, relaxing) and *formal interactions* (e.g. planned meetings, collaborating), for which respondents were asked to indicate the extent to which they consider the activities important. Figure 5.10 shows the relative importance of the knowledge worker activities as indicated by the respondents.

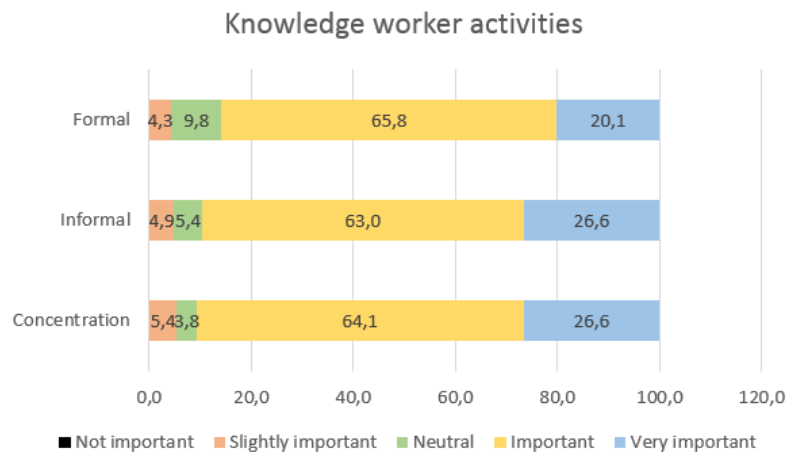


Figure 5.10: Perceived importance of knowledge worker activities

As can be seen in Figure 5.10, the relative importance of the three types of activities is very similar for the study sample. Clearly, concentration work, formal work and informal work are all (very) important activities for knowledge workers. Evidently, the results are as expected since these activities were selected for being the most dominant activities for knowledge workers throughout the literature (e.g. De Been & Beijer, 2014; Leesman, 2017; Berg, 2017). Notably, not a single respondent indicated that one of three activities is not important, while only a handful of respondents indicated that they are mere slightly important (concentration: 5,3%, informal: 4,9%, formal: 4,3%). According to the

respondents, concentration work is the most important activity for knowledge workers with 90,7% indicating that this activity is (very) important, followed by informal work with 89,6%. The “least important” activity for knowledge workers, according to the respondents, is formal work with 85,9% indicating that this activity is (very) important.

5.2.7. Physical workplace characteristics

For defining the physical workplace characteristics, a number of different variables were distinguished throughout the literature to address the office layout, office comfort, information and communication, office use and office location, respectively. Accordingly, this part of the questionnaire measured the extent to which respondents agree or disagree with statements that are related to the physical workplace characteristics of the activity based office workstyle. For this matter, a 5-point Likert scale was used ranging from 1 (strongly disagree) to 5 (strongly agree). Besides, questions were added in which respondents were asked to indicate how often they use a specific set of ‘rules’ that is associated with the activity based office concept. For these statements a 5-point Likert scale was used ranging from 1 (never) to 5 (always).

Below, each aspect of the physical environment will be elaborated separately, for which the data is described by using the mean and standard deviation. Besides, if possible, Cronbach alpha coefficients are calculated to check the internal consistency of the variables for each specific physical workplace aspect.

5.2.7.1. Office layout supportiveness

Throughout the questionnaire, a total of eight physical workplace aspects were addressed for assessing the office layout supportiveness. The results are shown in Table 5.22, while Appendix K.1 shows the distribution of the office layout variables.

The variables ‘workspace openness’ and ‘distance between workspaces’ were addressed by two and three statements respectively. Ideally, these items can be combined into a new variable, being ‘workspace openness’ and ‘distance between workspaces’ respectively. However, the Cronbach alpha coefficient (‘distance’) was too low (0.097), indicating that the items cannot be combined. The inter-item correlation for openness (.490), however, would be sufficient for combining the items. Besides the individual items, Cronbach’s alpha was also calculated to test whether the items load on the same factor, being office layout supportiveness. The result is shown in Table 5.22 as well.

Table 5.22: Distribution of office layout supportiveness

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted	Inter item
Office_lay_1	Office_layout_variety_best_workplace	3,47	1,17	0,654	-
Office_lay_2	Office_layout_availability_suitable_workplace	3,46	1,12	0,646	-
Office_lay_3	Office_layout_openness_open_transparant	3,90	0,82	0,635	.490
Office_lay_4	Office_layout_openness_movement	3,57	0,94	0,666	
Office_lay_5	Office_layout_distance_spatial_design	3,07	1,05	0,611	-
Office_lay_6	Office_layout_distance_workspace_allocation	2,39	0,92	0,674	-
Office_lay_7	Office_layout_distance_distraction	3,02	1,01	0,811	-
Office_lay_8	Office_layout_facilities_support	3,99	0,84	0,677	-
Sum score (N = 8)		3,36	0,98		
Cronbach's α (N = 8)		0,708			

As can be seen in Table 5.22, the mean value across the items ranges from 2,39 to 3,99 with an overall mean score of 3,36. With a mean value of 3,99 respondents agreed the most to the statement concerning facility support, indicating that, in most cases, the physical environment was supported by sufficient facilities (e.g. printers, storage, etc.). The second most agree to statement concerns workplace openness. With a mean value of 3,90 the majority indicated that they perceive the office environment as open and transparent. This result is very similar to a research conducted by Vosters (2017), who found a mean value of 3,95 on a 5-point Likert importance-scale. Both results make sense, since the activity based office concept is known for its open and transparent work environments. Notably, however, fewer respondents perceive the spatial design of the office environment optimal, with a mean value of 3,07.

The two lowest values both concern the aspect 'distance between workspaces'. However, this can be explained by the fact that these items were reversed. One out of three respondents (34,1%) indicated that they get easily distracted by overhearing colleagues in close proximity. This result, indeed, matches the results of the previous statement that the spatial design of the work environment is not always optimal. This might be explained by the fact that the respondents indicated that the workspaces (e.g. individual, flex-, combi-spaces), in general, are located next to each other, which could influence the distraction component negatively.

The Cronbach alpha coefficient for the office layout supportiveness factor in general is 0,708. As can be seen in Table 5.22, however, deleting the seventh item (e.g. distraction due to overhearing in close proximity, or 'proximity' in short) from the dataset would increase the Cronbach alpha coefficient to 0,811. Given the major increase in Cronbach's alpha, it was decided to extract this item from the dataset. Moreover, all but the seventh item will be combined into a new variable 'office layout supportiveness', while the seventh item will be included as an individual variable.

5.2.7.2. Perceived office comfort

Throughout the questionnaire, a total of ten physical workplace aspects were addressed for assessing the office comfort. The results are shown in Table 5.23, while Appendix K.2 shows the distribution of the office comfort variables.

Table 5.23: Distribution of perceived office comfort

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted
Office_com_1	Office_comfort_temperature	3,30	1,01	0,833
Office_com_2	Office_comfort_heating	3,36	0,91	0,835
Office_com_3	Office_comfort_ventilation	3,29	0,99	0,830
Office_com_4	Office_comfort_lighting	3,78	0,74	0,851
Office_com_5	Office_comfort_air_quality	3,26	0,95	0,835
Office_com_6	Office_comfort_personal_control	2,67	0,95	0,840
Office_com_7	Office_comfort_ergonomic_chairs	3,89	0,92	0,849
Office_com_8	Office_comfort_adjustable_desks	4,08	0,91	0,855
Office_com_9	Office_comfort_overall_ergonomics	3,79	0,94	0,840
Office_com_10	Office_comfort_overall_comfort	3,71	0,75	0,824
Sum score (N = 10)		3,51	0,91	
Cronbach's α (N = 10)		0,853		

As can be seen in Table 5.23, the mean value across the items ranges from 2,67 to 4,08. With an overall mean score of 3,51 the respondents within this study tend to perceive the office environment as (very) comfortable. Clearly, office comfort was assessed by two comfort-related aspects, being the ambient factors and ergonomics. Factor analysis indeed showed that the items concern two clear factors. Notably, respondents perceive the ergonomic-related items to be more comfortable than the ambient factor-related items. This is also shown by the fact that the item 'overall ergonomics' has a higher mean value than the item 'overall comfort'.

With a mean value of 4,08 respondents agreed the most to the statement concerning the adjustable office desks, followed by ergonomic office chairs with a mean value of 3,89. In line, overall comfort regarding ergonomics has a mean value of 3,79, indicating that the respondents perceive the physical ergonomics within the work environment as (very) comfortable. These results makes sense, since it has already been elaborated in Chapter 3 that performance, involvement and morale among employees would increase if they are able to exercise greater control over the indoor environmental characteristics (Clements-Croome & Baizhan Li, 1997; Roelofsen, 2002), which is the case for adjustable office furniture.

Items concerning the ambient factors all have a mean value ranging from 3,26 to 3,78, indicating that respondents perceive the ambient factors within work environment as (very) comfortable. The one exception is personal control over the aforementioned ambient factors. With a mean value of 2,67, this item scores substantially lower. This might be explained by the fact that the activity based office concept does not facilitate workplaces on an individual need basis. Nevertheless, the results are remarkable, since the lack of (personal) control over resources may be associated with greater burnout, especially the individual strain of exhaustion and the self-evaluation strain of inefficacy (e.g. Maslach et al., 2001; Bakker et al., 2013). However, with a mean value of 3,71, respondents perceive the overall comfort in general as comfortable.

Given the high Cronbach's alpha coefficient (0.853), it was decided to not remove any item from the dataset. Moreover, the study continues with one combined variable to assess the perceived office comfort.

5.2.7.3. ICT, office use- and location

Throughout the questionnaire, a total of fifteen physical workplace aspects were addressed for assessing the office use, information and communication technology and office location. The results are shown below, while Appendix K.3, K.4, and K.5 shows the distribution of these variables. The three workplace aspects were combined because they are all based on a set of rules, associated with the activity based office concept. For this matter, respondents were asked to indicate how often they used a specific rule. For these statements a 5-point Likert scale was used ranging from 1 (never) to 5 (always).

Accessibility to information and communication technology

A total of three variables were included in the questionnaire to address the accessibility to information and communication technology. More specifically, these statements were included to test whether organisations facilitate the possibility to use qualitative ICT. Since the activity based office concept does not facilitate workplaces on an individual need, it is very important to have access to ICT-services at any given point in time. The results are shown in Table 5.24, while an extensive overview of the distribution of each variable can be found in Appendix K.3.

Table 5.24: Distribution accessibility to ICT

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted
IUL_1	IUL_ICT_cloud_computing	4,05	1,28	0,564
IUL_2	IUL_ICT_mobile_tools	3,74	1,52	0,529
IUL_3	IUL_ICT_intranet	4,39	1,07	0,551
Sum score (N = 3)		4,06	1,29	
Cronbach's α (N = 3)		0,647		

As can be seen in Table 5.24, the majority of the respondents has indicated to have the opportunity to use cloud computing, rather than file cabinets (mean = 4,05) , and mobile tools (e.g. mobile cell phones, tablets) (mean = 3,74). Besides, the majority (88,6%) is able to use, for example, Intranet to work at any given location within the office (mean = 4,39). Moreover, it can be concluded that the participating organisations facilitate the possibility to use qualitative ICT.

Given the relatively low Cronbach's alpha coefficient (0.647), it can be concluded that the items cannot be combined into a new variable. For the purpose of data reduction, however, it was chosen to accept the Cronbach alpha as if it was significant, thereby combining the items into a new variable 'accessibility ICT'. Throughout literature, many studies were found that accepted Cronbach alpha coefficients below the threshold as well (e.g. Gosling et al., 2003; Maslach & Leiter, 2008).

Office use

A total of ten variables were included in the questionnaire to address the office use of respondents. Evidently, it is very important for all (staff) members within organisations to follow the rules associated with the activity based office concept. For instance, claiming behaviour of the non-personal workstations does not match the idea of the activity based concept. Table 5.25 shows the results for the internal consistency of the office use variables in terms of the Cronbach's alpha and the inter-item correlation (SPSS: reliability analysis), while an extensive overview of the distribution of each variable can be found in Appendix K.4.

Table 5.25: Distribution of office use

Variable	Label	Mean	St. dev.	Cronbach's Alpha if Item Deleted	Inter item
IUL_4	IUL_desk_switching_choose_best_workspace	3,55	1,27	0,489	.209
IUL_5	IUL_desk_switching_clear_out_workspace	2,41	1,42	0,574	
IUL_6	IUL_desk_sharing_leave_to_original_set_up	4,18	1,32	0,542	.250
IUL_7	IUL_desk_sharing_claiming_workspace	4,38	1,17	0,570	
IUL_8	IUL_interaction_social	3,43	1,06	0,556	.542
IUL_9	IUL_interaction_work_related	3,70	0,90	0,544	
IUL_10	IUL_distraction_interruptions	3,59	0,95	0,544	.326
IUL_11	IUL_distraction_crowding	3,71	0,99	0,544	
IUL_12	IUL_noise	3,71	1,01	0,525	-
IUL_13	IUL_privacy	3,35	1,23	0,488	-
Sum score (N = 10)		3,60	1,13		
Cronbach's α (N = 10)		0,344			

The Cronbach's Alpha (α) was used to test the internal consistency of the scale, for which the coefficient should be at least .7 (Devellis, 2012). If the coefficient is larger than the threshold (of .7), the items can be summated into the corresponding office use variable. Since the Cronbach alpha coefficient can be quite small if there are less than ten items included in the scale, which is the case for these office use variables, the inter-item correlation (for homogeneity) is computed as well. According to Pallant (2010), the optimal inter-item correlation value ranges from .2 to .4. The inter-item correlation value should also not be too high ($> .8$), because that could trigger a problem with multicollinearity.

As can be seen in Table 5.25, the mean value across the items ranges from 2,41 to 4,38. Common irritations associated with the activity based office concept derive from claiming behaviour (e.g. Meulenbroek et al., 2011). Notably, however, the majority of respondents indicated to never (70,7%) or sometimes (13,6%) claim workspaces by personalising them. Accordingly, the high mean value (4,38) can be explained by the fact that this is a reversed item. Besides, the majority (81,6%) indicated to leave the workspace back in its original and clean set-up, after finishing a task (mean = 4,18). This contradicts heavily with the statement concerning clearing out the workspace after being away for more than 15 minutes. With a mean value of 2,41, the majority indicated to never (or sometimes) do this. Seemingly, respondents agree to clearing out the workspace after they have fully completed a task, but refuse to act similarly when they are out on a small break.

It has already been argued that the respondents in this study indicated to value desk-sharing (rather than claiming). Accordingly, desk-sharing is argued to improve communication between office workers (De Croon et al., 2005). The latter matches with the results of the interaction-items. Moreover, the respondents have indicated to interact with colleagues on a social level on a regular base (mean = 3,43) and often have work-related conversations at and around the workspace (mean = 3,70).

Notably, the respondents have also indicated to be able to concentrate quite well. This does not seem to match with other results since they interact with colleagues regularly and experience excessive noise at least half the time (mean = 3,71). On the contrary, however, they indicated to have the opportunity to isolate themselves from colleagues if needed (mean = 3,35), thereby eliminating any possible distractions. With a mean value of 3,60 across all statements, it can be concluded that the respondents in this study follow the activity based office rules fairly well.

Given the relatively low Cronbach's alpha coefficient (0.344), factor analysis is computed to reduce the number of variables. Principal Axis Factoring was used as extraction method, while Direct Oblimin with Kaiser normalisation was used as rotation method since correlations between the factors are expected. No signs of multicollinearity and singularity were found in the correlation matrix, while the determinant is sufficiently large ($D = .207$). In addition, the Bartlett's test of sphericity is significant ($\text{Sig} = .000$) and the Kaiser-Meyer-Olkin measure is larger than the threshold of .6 (.616). The results of the factor analysis are shown in Table 5.26. To clarify the output table, it was extended with the label-column, Eigenvalues and explained variance per factor.

As can be seen in Table 5.26, the factor analysis resulted in four factors which have an Eigenvalues higher than one. The table explaining the total variance, as well as the Screeplot are attached in appendix L. The screeplot, indeed, shows four changes in direction that did make the cut-off of Eigenvalue higher than 1. Besides, the Pattern Matrix clearly shows four factors with two, three, three and one items per factor respectively. The four factors and its corresponding items all have fairly clear descriptions. The study, therefore, continues with four factors explaining 62,76% of the total variance. As can be seen in Table 5.26, the majority of original variables have been combined into new factors. The factors were labelled 'interaction', 'distraction', 'desk-switching', and 'claiming'. A more detailed explanation of each factor is given below. For computing the factors, however, it should be kept in mind that each item (partially) loads on all four factors, with some loadings bigger than others.

Table 5.26: Factor analysis for office use

Variable		Factor			
		Interaction	Distraction	Desk-switching	Claiming
IUL_8	IUL_interaction_social	,816	,000	-,014	,093
IUL_9	IUL_interaction_work_related	,661	,004	,022	-,002
IUL_12	IUL_noise	,094	,806	-,214	-,187
IUL_10	IUL_distraction_interruptions	,076	,681	,014	,026
IUL_11	IUL_distraction_crowding	-,166	,485	,140	,110
IUL_4	IUL_desk_switching_choose_best_workspace	,286	,018	,665	,032
IUL_13	IUL_privacy	,286	-,065	,425	-,138
IUL_5	IUL_desk_switching_clear_out_workspace	-,120	-,013	,396	,036
IUL_6	IUL_desk_sharing_leave_to_original_set_up	-,086	-,007	,378	-,226
IUL_7	IUL_desk_sharing_claiming_workspace	,058	-,009	-,025	,741
Eigenvalue		2,177	1,665	1,581	1,052
Explained variance (%)		21,77	16,65	15,81	10,52

- Factor 1 is called 'interaction' and includes the original items 'social interaction' and 'work-related interaction'. Notably, the items 'desk switching (choose best workplace)' and 'privacy' are moderately correlated to this factors as well. However, these items are correlated strongly to the third factor and seems to have a better fit with this factor.
- Factor 2 is called 'distraction' and is a more extensive factor of the original distraction variable. As the name implies, this factor contains the 'distraction' items, but is extended with the 'noise' variable which indicated whether respondents experience excessive noise.
- Factor 3 is called 'desk-switching' and is a more extensive factor of the original desk-switching variable. As the name implies, this factor contains the original 'desk-switching items, but is extended with the 'leave workspace to original setup' variable and 'privacy' variable. The term desk-switching was preferred over other terms since the extended variables might trigger desk-switching as well.
- Factor 4, finally, is called 'claiming'. Notably, this is the only factor that contains only one item. This factor only contains the item 'claiming workspaces', which would previously belong to the desk sharing variable.

Possibility to telework (office location)

Throughout the literature, the office location aspect of the physical work environment primarily stresses the opportunity to telework. More specifically, working outside the office. Accordingly, one can work at home, or one can work in between home and the office, also referred to as third places (e.g. Ross, 2010, p. 5). For this study, it is especially relevant whether respondents have the opportunity to telework. For this matter, two statements have been included in the questionnaire. The results are shown in Table 5.27, while an extensive overview of the distribution of each variable can be found in Appendix. K.5.

Table 5.27: Distribution of office location (possibility to telework)

Variable	Label	Mean	St. dev.	Inter item
IUL_14	IUL_telework_home	3,33	1,35	.613
IUL_15	IUL_telework_between_home_work	2,60	1,48	
Sum score (N = 2)		2,97	1,41	
Cronbach's α (N = 2)		0,759		

As can be seen in Table 5.27, the majority of respondents (56,7%) has indicated to be given the opportunity to often/always work at home (mean = 3,33). Fewer respondents perceive to have the opportunity to work in between home the office (mean = 2,60), although this might be correlated to the actual physical location in which the office is located (e.g. greater at hubs/campuses). Notably, however, 12,4% and 31,9% of the respondents, respectively, have indicated to never have the opportunity to telework. This does not seem to match the idea of the activity based office concept. However, this might be explained by the fact that (some) respondents have misinterpreted the statements and indicated whether they actually telework themselves. It may also be possible for (some) respondents to perceive that they are in a position that does not allow them telework.

Given the high Cronbach's alpha coefficient (0.759) and inter-item correlation (.613), it was deciding to combine both items into a new variable. Moreover, the study continues with one combined variable to assess the possibility to telework.

5.3. Conclusions

This chapter continued with the process of answering sub question 3: What is the relationship between the physical environment and the burnout – engagement continuum? In particular, this chapter focused on the data description for which the quantitative data was prepared and described. The quantitative data was collected by means of an online questionnaire between July 10th and September 4th. After the data preparation, a total of 184 usable questionnaires remained for further analyses.

Various statistical instruments were used for the data description. Reliability tests (e.g. Cronbach's alpha, factor analysis) were used to find latent factors among groups of variables. Based on the results, these groups can be combined into new variables. This data reduction is especially important since it reduces the complexity of the intended regression analyses (Chapter 7), which in turn increases the practical implication (e.g. Meulensteen, 2017).

Accordingly, personality has been reduced from ten to five variables, as the coefficients were sufficient to recode and compute all five personality traits. The situational variables were reduced from 11 to four variables (e.g. labelled 'recognition', 'overload', 'control', and 'appreciation'). The burnout – engagement continuum has been reduced from 15 to three variables (e.g. labelled 'personal', 'interpersonal', and 'self-evaluation'). Regarding the office layout, it was deciding to combine all but one item into a new variable 'office layout supportiveness', while the excluded item will be included as an individual variable. Perceived office comfort has been reduced from ten to one variable. Similar, office location, or the possibility to telework, has been reduced from two to one variable, while accessibility to ICT and office use have been reduced to one and four variables respectively. For the latter, four new factors were found through factor analysis, called 'interaction', 'distraction', 'desk-switching', and 'claiming', respectively. In conclusion, this means that the variables addressing the personality, situational variables, BEC, and physical workplace characteristics have been reduced from 69 to 21 variables.

Data concerning the socio-demographics were described by using Chi-square tests, for which the data in this study was compared to the data of the Central Bureau for Statistics (short: CBS), if possible. Compared to the Dutch nation-wide average, the sample includes a relatively high percentage of females and few single households. However, this can be explained by the fact that CBS does not provide specific information for knowledge workers, or activity based offices.

6. Bivariate analyses

In this chapter, bivariate correlations are computed between the dependent variables (e.g. burnout – engagement continuum dimensions) and independent variables (e.g. office layout, activities, situational variables, etc.) that were formed in Chapter 5 (see also Figure 6.1). Accordingly, these bivariate analyses form the base for the final regression analyses (Chapter 7). The main reason for performing bivariate analyses prior to the regression analyses is to exclude any variables that do not have a significant relationship with the burnout – engagement continuum to begin with. By doing so, the regression equations (Chapter 7) will be limited to significant variables so that the practical relevance of the final analyses will be retained. In Chapter 5, it has already been elaborated that the variables have been measured by means of a Likert scale, for which the majority of variables are (approximately) normally distributed. The corresponding bivariate analyses, therefore, will be computed by means of Pearson product-moment correlation coefficient (r) (Field, 2009). When needed, non-parametric tests are used. For assessing the strength of the correlations, Cohen's guidelines are used (Cohen in Pallant, 2016) (see also Section 4.3.1.1).

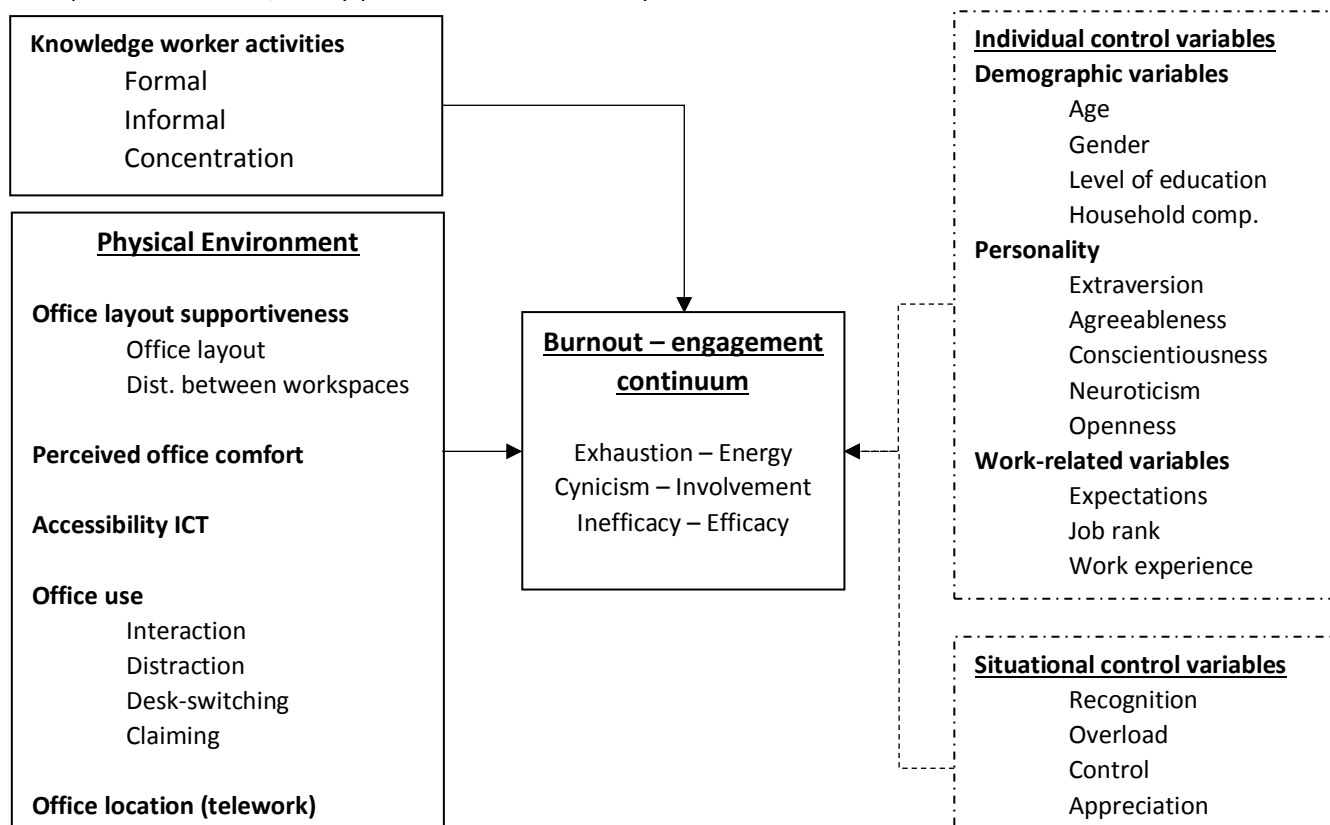


Figure 6.1: Conceptual model – elaboration of the constructs after data reduction

6.1. Knowledge worker activities

First, the relationships between knowledge worker activities and the burnout – engagement continuum dimensions are computed. Throughout the questionnaire, the following activities were taken into account; *concentration work* (e.g. individual focused work, reading, (creative) thinking), *informal interactions* (e.g. informal meetings, relaxing) and *formal interactions* (e.g. planned meetings, collaborating). These activities were selected for being the most dominant activities for knowledge workers throughout the literature (e.g. De Been & Beijer, 2014; Berg, 2017). The results of the

bivariate analyses between the importance of knowledge worker activities (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.1.

Table 6.1: Bivariate analyses between knowledge worker activities and BEC

Importance of knowledge worker activities N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Concentration	Pearson Correlation (r)	-,039	,112	,083
Informal	Pearson Correlation (r)	,097	,191**	,080
Formal	Pearson Correlation (r)	,028	,307**	,010

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.1. indicates that only two of the nine potential relationships between the importance of knowledge workers activities and the burnout – engagement continuum dimensions are significant. Both correlations are significant at the $p = .01$ level (2-tailed). No significant correlations exist between the activities and the individual strain dimension, nor between the activities and the self-evaluation strain dimension. The correlation coefficient for informal interactions with the interpersonal strain dimension is positive ($r = .191$, $n = 184$, $p = .009$). Similarly, the correlation coefficient for formal interactions with the interpersonal strain dimension is positive ($r = .307$, $n = 184$, $p = .000$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small (informal) and medium (formal), respectively. The results imply that an increase in either informal- or formal interactions is related to increased feelings of involvement. Informal interaction shares 3,6% ($r^2 \times 100\%$) of variance in the interpersonal strain dimension, while formal interaction has a slightly higher shared variance of 9,4%. This indicates that only 3,6% and 9,4% of the regression equations, respectively, can be explained by either informal- or formal interactions, which is not that surprisingly.

6.2. Physical work environment

Next, the relationships between the physical work environment and the burnout – engagement continuum dimensions are computed. Each of the five main variables, being office layout supportiveness, perceived office comfort, accessibility to ICT, office use and possibility to telework (office location), will be elaborated individually.

6.2.1. Office layout supportiveness

First, the relationships between the office layout supportiveness and burnout – engagement continuum are computed. As discussed in Chapter 5, data reduction has led to two remaining variables for office layout. The office layout variable consists of all but the seventh item (proximity), while proximity is addressed by the variable 'other' (Table 6.2). The results of the bivariate analyses between the office layout supportiveness (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.2.

Table 6.2: Bivariate analyses between office layout supportiveness and BEC

Office layout supportiveness N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Office layout	Pearson Correlation (r)	,100	,036	,060
Proximity	Pearson Correlation (r)	-,077	-,030	-,176*

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Surprisingly, Table 6.2 indicates that only one of the six potential relationships between the office layout supportiveness and the burnout – engagement continuum dimensions are significant. The correlation is significant at the $p = .05$ level (2-tailed). No significant correlations exist between office layout supportiveness and the individual strain dimension, nor between office layout supportiveness and the interpersonal strain dimension. The correlation coefficient for ‘proximity’ with the self-evaluation strain dimension is negative ($r = -.176, n = 184, p = .017$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. This result implies that an increase in proximity is related to decreased feelings of professional efficacy. Proximity shares only 3,1% ($r^2 \times 100\%$) of variance with the self-evaluation strain dimension.

It should be noted that the Cronbach’s alpha coefficient for the office layout supportiveness factor in general was 0,708 (Section 5.2.7.1), indicating that all items could have been combined into one factor. It was chosen to delete one item because this would increase the Cronbach’s alpha coefficient from .708 to .811. In the case that this study would have continued with only one factor for office layout supportiveness, the bivariate analyses would have resulted in no significant correlations with the burnout – engagement continuum dimensions whatsoever.

Moreover, the results imply that office layout supportiveness hardly has a significant relationship with the burnout – engagement continuum. This does not seem to match with prior findings toward the office layout. For instance, workspace allocation (e.g. sharing a room, proximity) has been argued to positively contribute to the efficacy component of engagement (self-evaluation strain) (e.g. Bakker et al., 2013). Rashid et al. (2006), for example, argue that open workspaces enhance face-to-face interaction through both seeing and overhearing, indicating a relationship with the involvement component of engagement (interpersonal strain). However, none of these potential relationships proposed in the literature review were found, which might be an interesting result itself.

6.2.2. Perceived office comfort

Next, the relationships between perceived office comfort and the burnout – engagement continuum dimensions are computed. Given the high Cronbach’s alpha coefficient (.853) for office comfort, all items were combined into one variable to assess perceived office comfort (see also Chapter 5). The results of the bivariate analyses between perceived office comfort (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.3.

Table 6.3: Bivariate analyses between perceived office comfort and BEC

Perceived office comfort N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Office comfort	Pearson Correlation (r)	,023	0,135	,144*

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.3. indicates that only one of the three potential relationships between perceived office comfort and the burnout – engagement continuum dimensions is significant. The correlation is significant at the $p = .05$ level (2-tailed). No significant correlations exist between office comfort and the individual strain dimension, nor between office comfort and the interpersonal strain dimension. The correlation coefficient for office comfort with the self-evaluation strain dimension is positive ($r = .144, n = 184, p = .050$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. This result implies that an increase in perceived office comfort is related to increased feelings of professional efficacy. Perceived office comfort shares only 2,1% ($r^2 \times 100\%$) of variance with the self-evaluation strain dimension, indicating that only 2,1% of the regression equation can be explained by perceived office comfort.

Although the result matches the expectations, at least some correlation was expected between perceived office comfort and the individual strain dimension as well. Given the literature review, Bluysen et al. (2010), for instance, argue overall office comfort to be related to greater efficacy and feelings of energy. Although the first correlation was found, the lack of additional significant correlations might be explained by the fact that *perceived* comfort is far too complex to relate directly to one or multiple components (Bluysen et al., 2010, p. 286). Roelofson (2002), for example, pointed out that the levels of discomfort would be amplified if users are not able to exert any control over such aspects. Subsequently, this lack of control over resources may be associated with greater burnout, especially the individual strain of exhaustion and the self-evaluation strain of inefficacy (e.g. Maslach et al., 2001; Bakker et al., 2013).

6.2.3. Accessibility information and communication technology

Next, the relationships between accessibility to ICT and the burnout – engagement continuum dimensions are computed. As indicated before, the ICT-variable was formed by combining three inter-related items, being cloud computing, mobile tools and Intranet. Notably, this variable was not normally distributed. Accordingly, Spearman's rho was computed as non-parametric alternative to Pearson's correlation. The results of the bivariate analyses between accessibility to ICT (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.4.

Table 6.4: Bivariate analyses between accessibility to ICT and BEC

Accessibility to ICT N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
ICT	Spearman's rho	,091	,076	,155*

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Similar to perceived office comfort, Table 6.4. indicates that only one of the three potential relationships between accessibility to ICT and the burnout – engagement continuum dimensions is significant. The correlation is significant at the $p = .05$ level (2-tailed). No significant correlations exist between accessibility to ICT and the individual strain dimension, nor between accessibility to ICT and the interpersonal strain dimension. The correlation coefficient for accessibility to ICT with the self-evaluation strain dimension is positive ($r = .155$, $n = 184$, $p = .036$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. The result implies that an increase in accessibility to ICT-services (e.g. log-in anywhere, mobile tools, facilities) is related to increased feelings of professional efficacy. Accessibility to ICT shares only 2,4% ($r^2 \times 100\%$) of variance with the self-evaluation strain dimension, indicating that only 2,4% of the regression equation can be explained by accessibility to ICT-services such as the opportunity to use cloud computing, rather than file cabinets, and mobile tools.

6.2.4. Office use

Next, the relationships between office use and the burnout – engagement continuum dimensions are computed. As indicated in previous chapters, six variables were identified for office use, being desk-switching, desk-sharing, interaction, distraction, noise, and privacy. Factors analyses, then, showed that the factors apparently have a deeper meaning, resulting in four new factors. These factors were labelled interaction, distraction, desk-switching, and claiming. Notably, the latter variable was not normally distributed. Accordingly, Spearman's rho was computed as non-parametric alternative to Pearson's correlation. The results of the bivariate analyses between these variables (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.5.

Table 6.5: Bivariate analyses between office use and BEC

Office use N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Interaction	Pearson Correlation (r)	,078	,085	,168*
Distraction	Pearson Correlation (r)	-,282**	-,176*	-,110
Desk-Switching	Pearson Correlation (r)	,008	,074	,210**
Claiming	Spearman's rho	-,086	-,103	-,0,37

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.5. indicates that four of the twelve potential relationships between office use and the burnout – engagement continuum dimensions are significant. The correlation between distraction and the individual strain dimension, as well as the correlation between desk-switching and the self-evaluation strain dimension are significant at the $p = .01$ level (2-tailed). The correlation between distraction and the interpersonal strain dimension, as well as the correlation between interaction and the self-evaluation strain dimension are significant at the $p = .05$ level (2-tailed).

The correlation coefficient for distraction ($r = -.282$, $n = 184$, $p = .000$) with the individual strain dimension is negative. According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. This result implies that an increase in distraction is related to decreased feelings of energy. Distraction shares 8,0% of variance ($r^2 \times 100\%$) with the individual strain dimension.

The correlation coefficient for distraction ($r = -.176$, $n = 184$, $p = .017$) with the interpersonal strain dimension is negative as well. According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. This result implies that an increase in distraction is related to decreased feelings of involvement. Distraction shares 3,1% of variance ($r^2 \times 100\%$) with the interpersonal strain dimension.

The correlation coefficients for interaction ($r = .168$, $n = 184$, $p = .022$) and desk-switching ($r = .210$, $n = 184$, $p = .004$) with the self-evaluation strain dimension are positive. According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small. The results imply that an increase in either interaction or desk-switching (e.g. choose best workplace for each activity) is related to increased feelings of professional efficacy. The factors share 2,8% (*interaction*) and 4,4% (*desk-switching*) of variance ($r^2 \times 100\%$) with the self-evaluation strain dimension.

6.2.5. Possibility to telework (office location)

Next, the relationships between office location and the burnout – engagement continuum dimensions are computed. As indicated before, office location primarily focusses on the opportunity to telework. Accordingly, this variable was formed by combining two inter-related items, being working at home and working at third places. The results of the bivariate analyses between the possibility to telework (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.6.

Table 6.6: Bivariate analyses between possibility to telework and BEC

Possibility to telework (office location) N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Telework	Pearson Correlation (r)	-,015	,020	-,006

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Surprisingly, Table 6.6 indicates that none of the three potential relationships between the possibility to telework and the burnout – engagement continuum dimensions are significant. Moreover, the

results imply that office location, or teleworking has no significant relationship with the burnout – engagement continuum. This does not seem to match with prior findings toward office location.

Whereas advocates of telework, for example, mention a positive relationship with work-home interference e.g. (enhanced autonomy and control, increased flexibility in scheduling (e.g. working hours), and reduced costs for transportation), adversaries may argue that telework reduces the sense of community among co-workers and other staff members. Consequently, reduced feelings of community result in a lack of (active) feedback and support from either supervisors and co-workers which, in turn, may be related with all three dimensions of the burnout – engagement continuum (e.g. Maslach et al., 2001; Maslach & Leiter, 2008).

Zedeck and Mosier (1990), for example, pointed out that teleworking might restrict career development for vulnerable groups (e.g. elderly individuals, pregnant couples), since they are isolated from the organisation, thereby potentially diminishing their promotion possibilities (Demerouti, 2006). In addition, working from home whilst being permanently connected at the same time may indicate that work never stops. Strict lines for both the beginning and end time are diminished as a result of the perceived flexibility and autonomy that comes along with teleworking. So, although it might be beneficial for individuals, it might also extend the workday, hence increase workload and job stress. Nevertheless, none of the potential relationships proposed in the literature review were found, which might be an interesting result itself.

6.3. Situational variables

Next, the relationships between the situational variables and the burnout – engagement continuum dimensions are computed. As indicated in previous chapters, six organisational risk factors (situational variables) were identified, being workload, control, rewards, community, fairness, and values. Factors analyses, then, showed that the factors apparently have a deeper meaning, resulting in four new factors. These factors were labelled recognition, overload, control, and appreciation. The results of the bivariate analyses between these situational variables (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.7.

Table 6.7: Bivariate analyses between situational variables and BEC

Situational variables N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Recognition	Pearson Correlation (r)	,228**	,297**	,146*
Overload	Pearson Correlation (r)	-,365**	-,106	,037
Control	Pearson Correlation (r)	-,130	-,196**	-,370**
Appreciation	Pearson Correlation (r)	,054	,367**	,290**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.7. indicates that eight of the twelve potential relationships between the situational variables and the burnout – engagement continuum dimensions are significant. The majority of correlations are significant at the $p = .01$ level (2-tailed), with the exception of correlation between recognition and the self-evaluation strain dimension which is significant at the $p = .05$ level (2-tailed).

The correlation coefficients for recognition ($r = .228$, $n = 184$, $p = .002$) with the individual strain dimension is positive, whereas the correlation coefficient for overload ($r = -.365$, $n = 184$, $p = .000$) with the individual strain dimension is negative. According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small (*recognition*) and medium (*overload*), respectively. The results imply that an increase in recognition is related to increased feelings of energy. An increase in

overload, on the other hand, is related to decreased feelings of energy. The factors share 5,2% (*recognition*) and 13,3% (*overload*) of variance ($r^2 \times 100\%$) with the individual strain dimension.

The correlation coefficients for recognition ($r = .297$, $n = 184$, $p = .000$), control ($r = .196$, $n = 184$, $p = .008$), and appreciation ($r = .367$, $n = 184$, $p = .000$) with the interpersonal strain dimension are positive. According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small (*recognition* and *control*) and medium (*appreciation*), respectively. The results imply that an increase in either recognition, control, or appreciation is related to increased feelings of involvement. The factors share 8,8% (*recognition*), 3,8% (*control*), and 13,5% (*appreciation*) of variance ($r^2 \times 100\%$) with the interpersonal strain dimension.

The correlation coefficients for recognition ($r = .146$, $n = 184$, $p = .048$), control ($r = .370$, $n = 184$, $p = .000$), and appreciation ($r = .290$, $n = 184$, $p = .000$) with the self-evaluation strain dimension are positive. According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small (*recognition* and *appreciation*) and medium (*control*), respectively. The results imply that an increase in either recognition, control, or appreciation is related to increased feelings of professional efficacy. The factors share 2,1% (*recognition*), 13,7% (*control*), and 8,4% (*appreciation*) of variance ($r^2 \times 100\%$) with the self-evaluation strain dimension.

6.4. Personality

Next, the relationships between personality and the burnout – engagement continuum dimensions are computed. As indicated before, personality was assessed by using five personality traits (Big Five Inventory), being extraversion, agreeableness, conscientiousness, neuroticism, and openness. Accordingly, the variables were computed by combining two inter-related items for each personality trait. Notably, conscientiousness was not normally distributed. Accordingly, Spearman's rho was computed as non-parametric alternative to Pearson's correlation. The results of the bivariate analyses between personality (scale 1 to 5) and the dimensions of the burnout – engagement continuum are shown in Table 6.8.

Table 6.8: Bivariate analyses between personality and BEC

Personality N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Extraversion	Pearson Correlation (r)	,121	,221**	,263**
Agreeableness	Pearson Correlation (r)	,087	,212**	,198**
Conscientiousness	Spearman's rho	,061	,188*	,225**
Neuroticism	Pearson Correlation (r)	-,202**	-,150*	-,314**
Openness	Pearson Correlation (r)	,015	,231**	,158*

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

As can be seen in Table 6.8, eleven of the fifteen potential relationships between personality and the burnout – engagement continuum dimensions are significant. Notably, while all personality traits seem to correlate significantly with the interpersonal strain dimension and self-evaluation strain dimension, only one personality trait (*neuroticism*) correlates significantly with the individual strain dimension.

The latter correlation is significant at the $p = .01$ level (2-tailed). The correlation coefficient for neuroticism with the individual strain dimension is negative ($r = -.202$, $n = 184$, $p = .006$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationships is small. This result implies that an increase in neuroticism is related decreased feelings of energy. In other words, an increase in

neuroticism is related to increased feelings of exhaustion. Neuroticism shares only 4,1% ($r^2 \times 100\%$) of variance with the individual strain, indicating that only 4,1% of the regression equation can be explained by neuroticism.

The interpersonal strain dimension is significantly correlated to all five personality traits. The correlation coefficients for extraversion, agreeableness, and openness are significant at the $p = .01$ level (2-tailed). The correlation coefficients for neuroticism and openness, however, are significant at the $p = .05$ level (2-tailed). Whereas the correlation coefficient for extraversion ($r = .221, n = 184, p = .003$), agreeableness ($r = .212, n = 184, p = .004$), conscientiousness ($r = .188, n = 184, p = .011$), and openness ($r = .231, n = 184, p = .002$) with the interpersonal strain dimension are positive, the correlation coefficient for neuroticism with the interpersonal strain dimension is negative ($r = -.150, n = 184, p = .042$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small. The results imply that an increase in either extraversion, agreeableness, conscientiousness, or openness is related to increased feelings of involvement. On the other hand, an increase in neuroticism is related to decreased feelings of involvement. In other words, an increase in neuroticism is related to increased feelings of cynicism. The personality traits share 4,9% (*extraversion*), 4,5% (*agreeableness*), 3,5% (*conscientiousness*), 2,3% (*neuroticism*), and 5,3% ($r^2 \times 100\%$) of variance with the interpersonal strain dimension.

Similar to the interpersonal strain dimension, the self-evaluation strain dimension is significantly correlated to all five personality traits. The correlation coefficients for extraversion, agreeableness, conscientiousness and neuroticism are significant at the $p = .01$ level (2-tailed). The correlation coefficient for openness, however, is significant at the $p = .05$ level (2-tailed). Whereas the correlation coefficient for extraversion ($r = .263, n = 184, p = .000$), agreeableness ($r = .198, n = 184, p = .007$), conscientiousness ($r = .225, n = 184, p = .002$), and openness ($r = .158, n = 184, p = .032$) with the self-evaluation strain dimension are positive, the correlation coefficient for neuroticism with the interpersonal strain dimension is negative ($r = -.314, n = 184, p = .000$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationships are small with the exception of neuroticism (medium). The results imply that an increase in either extraversion, agreeableness, conscientiousness, or openness is related to increased feelings of professional efficacy. On the other hand, an increase in neuroticism is related to decreased feelings of professional efficacy. In other words, an increase in neuroticism is related to increased feelings of inefficacy. The personality traits share 6,9% (*extraversion*), 3,9% (*agreeableness*), 5,1% (*conscientiousness*), 9,9% (*neuroticism*), and 2,5% ($r^2 \times 100\%$) of variance with the self-evaluation strain dimension.

The results are consistent with prior findings towards the relationship between burnout and personality. In a research conducted by Maslach and Leiter (2008), for example, the authors argue that the only consistent findings for this relationship, besides some suggestive trends, were found in research on the Big Five personality traits, which was the same instrument as used for this study. Accordingly, a consistent relationship has been found between neuroticism and burnout (Maslach & Leiter, 2008; Maslach et al., 2001).

6.5. Socio-demographics

Next, the relationships between socio-demographics and the burnout – engagement continuum dimensions are computed. As indicated before, socio-demographic variables (e.g. age, gender, education level, etc.) are used as control variables for the final regression analyses (Chapter 7). Notably, however, not all the variables were normally distributed. Accordingly, Spearman's rho was computed as non-parametric alternative to Pearson's correlation. The results of the bivariate analyses between socio-demographics and the dimensions of the burnout – engagement continuum are shown in Table 6.9.

Table 6.9: Bivariate analyses between socio-demographics and BEC

Socio-demographics N = 184, N _{age} = 182		BEC individual	BEC interpersonal	BEC self-evaluation
Age	Pearson Correlation (r)	,106	,109	,277**
Education level	Spearman's rho	,046	-,066	-,064
Household composition	Pearson Correlation (r)	,050	-,024	,061

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.9. indicates that only one of the nine potential relationships between socio-demographics and the burnout – engagement continuum dimensions are significant. The correlation is significant at the $p = .01$ level (2-tailed). Notably, no significant correlations exist between socio-demographics and the interpersonal strain dimension (for individual strain dimension see Section 6.5.1.).

The correlation coefficient for age with the self-evaluation strain dimension is positive ($r = .277$, $n = 184$, $p = .000$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. This result implies that an increase in age is related to increased feelings of professional efficacy. Age shares 7,7% ($r^2 \times 100\%$) of variance with the self-evaluation strain dimension, indicating that 7,7% of the regression equation can be explained by someone's age.

Although the results match the expectations, other socio-demographics (e.g. education level, household composition), surprisingly, have no significant relationships with the burnout – engagement continuum, which might be an interesting result itself. According to Maslach et al. (2001), for example, people with higher levels of education seem to report higher levels of burnout than less educated people. With regard to household composition, Maslach et al. (2001) found that unmarried employees are more likely to experience burnout compared with those who are married. In addition, the authors found that single employees seem to report even higher burnout levels than those who are divorced (Maslach et al., 2001). Nevertheless, none of these potential relationships proposed in the literature review were found.

6.5.1. Gender

Gender is dichotomous variable. Accordingly, the bivariate analysis was computed by means of a Mann-Whitney U test. The result of the bivariate analysis between gender and the dimensions of the burnout – engagement continuum is shown in Table 6.10.

Table 6.10: Bivariate analyses between gender and BEC

Gender N = 184	BEC individual	BEC interpersonal	BEC self-evaluation
Mann-Whitney U	3025,500	3749,000	3922,000
Wilcoxon W	6346,500	7070,000	7243,000
Z	-3,544	-1,311	-,767
Asymp. Sig. (2-tailed)	,000	,190	,443

a. Grouping Variable: Gender

As can be seen in Table 6.10, a significant relationship exists between gender and the burnout – engagement continuum. The correlation is significant at the $p = .05$ level (2-tailed). The correlation coefficient for gender with the individual strain dimension is negative ($Z = -.3.544$, $n = 184$, $p = .000$). Since the results of the bivariate analyses merely indicate the relationship between two variables and no causality, it is hard to explain the results.

Based on the literature review, however, one might argue that males seem to score higher on the cynicism component of burnout, whereas females appear to score higher on the exhaustion component of burnout (Maslach et al., 2001). Accordingly, the negative correlation coefficient might indicate that females, indeed, score higher on the exhaustion component (individual strain dimension).

6.6. Work-related variables

Finally, the relationships between work-related variables and the burnout – engagement continuum dimensions are computed. Similar to the socio-demographics (e.g. age, gender, education level, etc.), work-related variables are used as control variables for the final regression analyses (Chapter 7). Notably, however, not all the variables were normally distributed. Accordingly, Spearman's rho was computed as non-parametric alternative to Pearson's correlation. The results of the bivariate analyses between work-related variables and the dimensions of the burnout – engagement continuum are shown in Table 6.11.

Table 6.11: Bivariate analyses between work-related variables and BEC

Work-related variables N = 184		BEC individual	BEC interpersonal	BEC self-evaluation
Contract (workhours)	Pearson Correlation (r)	-,255**	,008	-,096
Contract (telework workhours)	Spearman's rho	-,025	-,067	,047
work experience (employment)	Pearson Correlation (r)	,038	,052	,339**
Work experience (employers)	Spearman's rho	,001	-,026	-,058

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.11. indicates that two of the twelve potential relationships between work-related variables and the burnout – engagement continuum dimensions are significant. The correlations are significant at the $p = .01$ level (2-tailed). Notably, no significant correlations exist between work-related variables and the interpersonal strain dimension.

The correlation coefficient for workhours with the individual strain dimension is negative ($r = -.255$, $n = 184$, $p = .000$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is small. This result implies that an increase in workhours is related to decreased feelings of energy. In other words, an increase in workhours is related to increased exhaustion. Workhours shares 6,5% ($r^2 \times 100\%$) of variance with the individual strain dimension, indicating that only 6,5% of the regression equation can be explained by workhours (e.g. length of professional workweek).

The correlation coefficient for employment (work experience) with the self-evaluation strain dimension is positive ($r = .339$, $n = 184$, $p = .000$). According to Cohen (Cohen in Pallant, 2016), the strength of the relationship is medium. This result implies that an increase in work experience is related to increased feelings of professional efficacy. Work experience shares 11,5% ($r^2 \times 100\%$) of variance with the self-evaluation strain dimension, indicating that 11,5% of the regression equation can be explained by work experience (years of employment).

Although the results match the expectations, other work-related variables (e.g. *work experience, employers*), surprisingly, have no significant relationships with the burnout – engagement continuum, which might be an interesting result itself. Besides, the variable 'telework workhours', being the quantitative item of 'office location' (possibility to telework), shows a consistent result throughout this research, since the 'possibility to telework' did not result in a significant relationship whatsoever.

6.6.1. Job rank

As indicated in Chapter 5, job rank was transformed into a dichotomous variable for which the original job ranks were reduced to either regular employee or manager/supervisor. Since job rank is a dichotomous variable, the bivariate analysis was computed by means of a Mann-Whitney U test. The result of the bivariate analysis between job rank and the dimensions of the burnout – engagement continuum is shown in Table 6.12. Accordingly, no significant relationship exists between job rank and the burnout – engagement continuum dimensions, where at least some significant correlation was expected (e.g. Bodin-Danielsson & Bodin, 2008; 2009).

Table 6.12: Bivariate analyses between job rank and BEC

Job rank N = 184	BEC individual	BEC interpersonal	BEC self-evaluation
Mann-Whitney U	2971,500	3021,500	2994,500
Wilcoxon W	12982,500	3967,500	13005,500
Z	-,218	-,036	-,133
Asymp. Sig. (2-tailed)	,828	,971	,894

a. Grouping Variable: Rec Job rank

6.6.2. Nature of contract

Throughout the questionnaire, the contractual situation was assessed by one variable for which respondents were asked to indicate whether they have a permanent or an indefinite contract. Since contract (nature) is a dichotomous variable, the bivariate analysis was computed by means of a Mann-Whitney U test. The result of the bivariate analysis between contractual situation (e.g. permanent or indefinite contract) and the dimensions of the burnout – engagement continuum is shown in Table 6.13. Accordingly, no significant relationship exists between the nature of contract and the burnout – engagement continuum dimensions, where at least some significant correlation was expected.

Table 6.13: Bivariate analyses between contract (nature) and BEC

Contract (nature) N = 184	BEC individual	BEC interpersonal	BEC self-evaluation
Mann-Whitney U	1344,000	1366,500	1228,500
Wilcoxon W	15205,000	15227,500	1399,500
Z	-,775	-,661	-1,364
Asymp. Sig. (2-tailed)	,438	,509	,173

a. Grouping Variable: Contract nature

6.6.3. Expectations potentials

As indicated in Chapter 5, respondents' expectation pattern and its outcome were combined and transformed into a dichotomous variable for which the original combinations were reduced to either (very) high expectations that did not come true (potentials), or any other combination. Since expectation potentials is a dichotomous variable, the bivariate analysis was computed by means of a Mann-Whitney U test. The result of the bivariate analysis between expectations and the dimensions of the burnout – engagement continuum is shown in Table 6.14. Accordingly, no significant relationship exists between expectations and the burnout – engagement continuum dimensions, where at least some significant correlation was expected (e.g. Maslach et al., 2001, p.411).

Table 6.14: Bivariate analyses between expectations (potentials) and BEC

Expectations (potential) N = 184	BEC individual	BEC interpersonal	BEC self-evaluation
Mann-Whitney U	836,000	756,000	912,500
Wilcoxon W	914,000	834,000	990,500
Z	-1,219	-1,722	-0,739
Asymp. Sig. (2-tailed)	,223	,085	,460

a. Grouping Variable: Expectations potentials

6.7. Conclusions

In this chapter, bivariate correlations were computed between the dependent variables (e.g. burnout – engagement continuum dimensions) and independent variables (e.g. office layout supportiveness, activities, situational variables, etc.) that were formed in Chapter 5. Accordingly, these bivariate analyses form the base for the final regression analyses (Chapter 7). The main reason for performing bivariate analyses prior to the regression analyses was to exclude any variables that do not have a significant relationship with the burnout – engagement continuum to begin with.

Interestingly, the results imply that many variables were not significantly correlated to the burnout – engagement continuum, even when this might have been expected. Concentrated work (e.g. focused work, reading and creative thinking) did not show any significant correlation, even though it was the single most important knowledge worker activity according to the respondents. Surprisingly, office layout did not show any significant correlation even though its attributes (e.g. availability- and variety of workplaces, workspace openness, workspace allocation, facilities) are believed to stimulate engagement (e.g. Maslach et al., 2001; Maslach & Leiter, 2008; Appel-Meulenbroek et al., 2016). Claiming behaviour may be associated with feelings of exhaustion and cynicism (e.g. Maslach et al., 2001). However, none of these potential relationships were found. Similar to office layout, the lack of correlation between telework and the burnout – engagement continuum dimensions was surprisingly. Although teleworking might increase workers' performances, literature suggested a negative correlation with the burnout components (e.g. Maslach et al., 2001; Demerouti et al., 2014). Literature also suggested higher levels of burnout among higher educated workers. Maslach et al. (2001), for example, stressed that people with higher education have jobs with greater responsibilities and higher stress. This relationship, however, was not found which might be due to too little variation in the study sample (e.g. the majority of respondents (77,7%) was highly educated). Similarly, no significant correlation was found for household composition, whereas some correlation with burnout was expected. This also applies to the respondents' expectations. According to Maslach et al. (2001), high expectations may result in exhaustion and eventual cynicism when the high effort does not yield the expected results (p. 411). The results, however, did not confirm this potential relationship. Similar to the aforementioned variables, telework (workhours), the number of employers, job rank, and nature of contract did not show any significant results as well.

In total, 32 significant correlations were found between the dependent- and independent variables (Table 6.15). Six of these correlated significantly with the individual strain dimension, eleven correlated significantly with the interpersonal strain dimension, and fifteen correlated significantly with the self-evaluation strain dimension. All signs were as expected with the exception of control, which showed a negative correlation with the interpersonal and self-evaluation strain dimensions of the burnout – engagement continuum. Although this counter-intuitive result cannot be linked to prior research, one possible explanation may be the activity based office itself, as the concept rules out any form of personalisation, albeit (personal) control. Notably, regarding the main variables, the individual

and interpersonal strain dimensions only show a significant correlation with distraction (*office use*), while the self-evaluation strain dimension shows significant correlations with proximity (*office layout supportiveness*), perceived office comfort, accessibility to ICT, interaction and desk-switching (*office use*).

According to Cohen (Cohen in Pallant, 2016), the strength of all but six relationships with the burnout – engagement continuum dimensions were small. The exceptions were formal interaction (*activities*), overload, control and appreciation (*situational variables*), neuroticism (*personality*), and work experience (*work-related variables*), which were all of medium strength. Evidently, the small correlations contributed little to the explained variance of the burnout – engagement dimensions.

Since the bivariate analyses in this chapter merely indicate a possible relationship between the dependent and independent variables at the time, partial correlations are not taken into account. The regression analyses (Chapter 7) will determine the final strength and effects between the variables when all variables are included at the same time.

Table 6.15: Overview bivariate analyses

Main variables			
Activities	Individual strain	Interpersonal strain	Self-evaluation strain
Concentration	0	0	0
Formal interaction	0	+	0
Informal interaction	0	+	0
Office layout supportiveness			
Office layout	0	0	0
Proximity (overhearing)	0	0	-
Perceived office comfort			
Perceived office comfort	0	0	+
Accessibility to ICT			
Accessibility to ICT	0	0	+
Office use			
Interaction	0	0	+
Distraction	-	-	0
Desk-switching	0	0	+
Claiming	0	0	0
Office layout			
Possibility to telework	0	0	0
Control variables			
Situational variables			
Recognition	+	+	+
Overload	-	0	0
Control	0	-	-
Appreciation	0	+	+
Personality			
Extraversion	0	+	+
Agreeableness	0	+	+
Conscientiousness	0	+	+
Neuroticism	-	-	-
Openness	0	+	+
Socio-demographics			

Age	0	0	+
Education level	0	0	0
Household composition	0	0	0
Gender	-	0	0
Work-related variables			
Contract (workhours)	-	0	0
Contract (telework workhours)	0	0	0
work experience (employment)	0	0	+
Work experience (employers)	0	0	0
Job Rank	0	0	0
Contract Nature	0	0	0
Expectations Potential	0	0	0
Total	6	11	15

7. Multiple regression analyses and results

This chapter concludes the process of answering sub question 3: What is the relationship between the physical environment and the burnout – engagement continuum? This chapter, in particular, focuses on multiple regression analyses, for which the data that has been prepared and described throughout the previous chapters (Chapter 4 to Chapter 6) is analysed. In addition, the results are shown and briefly discussed. The first section discusses the theoretical background and application of regression analyses for this research (Section 7.1). The final regression analyses and its results are shown and discussed in Section 2, for which the results are reflected to the findings of the literature review, while Section 3 elaborates on the physical workplace characteristics. This chapter ends with the conclusions in which the third, and fourth, sub-question are answered.

7.1. Regression model

7.1.1. Theoretical background

For this study, multiple regression analysis (MRA) is used to determine the effect of independent variables on the burnout – engagement continuum dimensions. The dependent variables are the burnout – engagement continuum dimensions, or individual-, interpersonal-, and self-evaluation strain dimension, respectively. The independent variables consist of knowledge worker activities (formal- and informal interaction), perceived office comfort, accessibility to information and communication technology, office use (interaction, distraction, desk-switching), situational variables (recognition, overload, control, appreciation), personality traits, socio-demographics (e.g. age, gender), and work-related variables (workhours, work experience). Throughout Chapter 6, these variable were identified to have a significant relationship with the dependent variables.

A great deal of care should be taken to avoid any violations of the assumptions, because they can affect the reliability of the results (Section 4.4.2). Although the majority of variables are of continuous nature, some socio-demographic- and work-related variables are of categorical nature. Since categorical variables cannot be entered in the MRA, they were recoded into dummy variables. However, bivariate analyses already reduced the number of dummy variables used as input for the MRAs to one variable (e.g. gender: male or female). An overview of the input variables and their codes can be found in Appendix M. In general, dummy variables are categorical variables that have been transformed into dichotomous variables with only two values (no = 0, yes = 1) (e.g. Pallant, 2010). The number of dummies is $n - 1$, in which n is the number of groups included in the original variable. First, the number of groups has to be defined, after which one of the groups is identified as reference group. The reference group is the group against which all other groups are compared (Field, 2009).

7.1.2. Multiple regression analyses

For this study, multiple regression analysis (MRA) is used to determine the effect of independent variables on the burnout – engagement continuum dimensions. The corresponding regression equation is a very helpful tool to determine the mutual relationship between the physical environment and the burnout – engagement continuum (third sub-question), as well as the strength of the relationships (fourth sub-question). At the same time, MRA is used to provide an answer to main question of this research, being: *“What characteristics of the physical work environment in activity based offices are related to the position of workers on the burnout – engagement continuum and how big is their influence?”* For this matter, three MRAs are performed to investigate the effect of the physical workplace characteristics on the individual-, interpersonal-, and self-evaluation strain dimension, respectively.

Although MRA can be used to explore many different results (e.g. how well do the personality traits predict the position of workers on the burnout – engagement continuum, compared to the situational variables?), it is especially interesting to test how much variance of the burnout – engagement continuum dimensions is explained (R^2) by the main variables (e.g. physical workplace characteristics). Accordingly, two steps in each MRA are computed for each dependent variable (Figure 7.1 and 7.2), which leads to a total of six MRAs. The results of the first MRA (model I) explains the amount of variance explained by all variables but the physical workplace characteristics. For the second MRA (model II), then, the physical workplace characteristics are included so that the results show the increase in explained variance caused by the inclusion of the physical workplace characteristics. Based on these differences (in explained variance), conclusions can be drawn on how well the physical workplace characteristics predict the position of workers on the burnout – engagement continuum, compared to the control variables. This process is similar for all three dimensions of the burnout – engagement continuum.

Model I

The first model (or MRA) includes all variables but the physical workplace characteristics (Figure 7.1). More specifically, this model contains two knowledge workers activities (formal- and informal interactions), four situational variables (recognition, overload, control, appreciation), five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, openness), two socio-demographic variables (age, male), and two work-related variables (workhours, work experience). Both the independent and dependent variables are of continuous nature, with the exception of gender (dummies; male and female).

Model II

The second model (or MRA) includes all variables to determine how well the physical workplace characteristics predict the position of workers on the burnout – engagement continuum (Figure 7.2). More specifically, besides the variables in model I, this model contains perceived office comfort, accessibility to ICT, and three office use variables (interaction, distraction, desk-switching). The extra variables, relative to model I, are all of continuous nature.

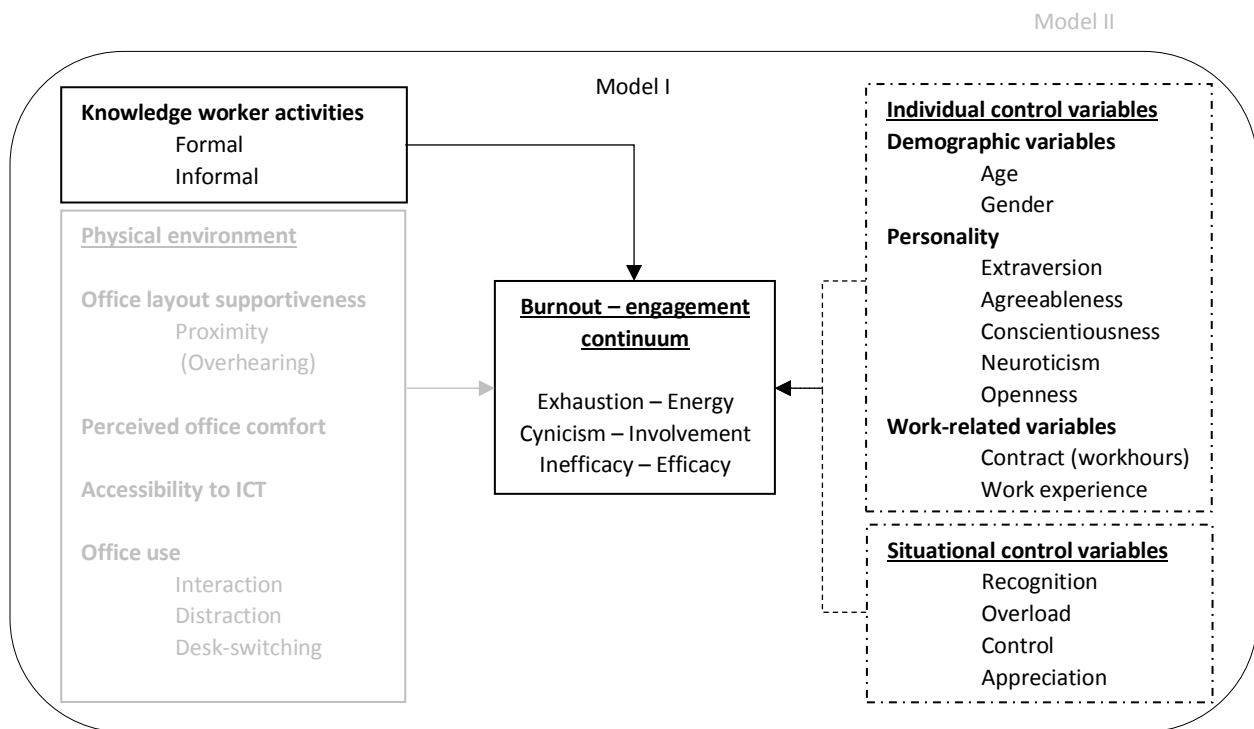


Figure 7.1: Multiple regression analyses – model I

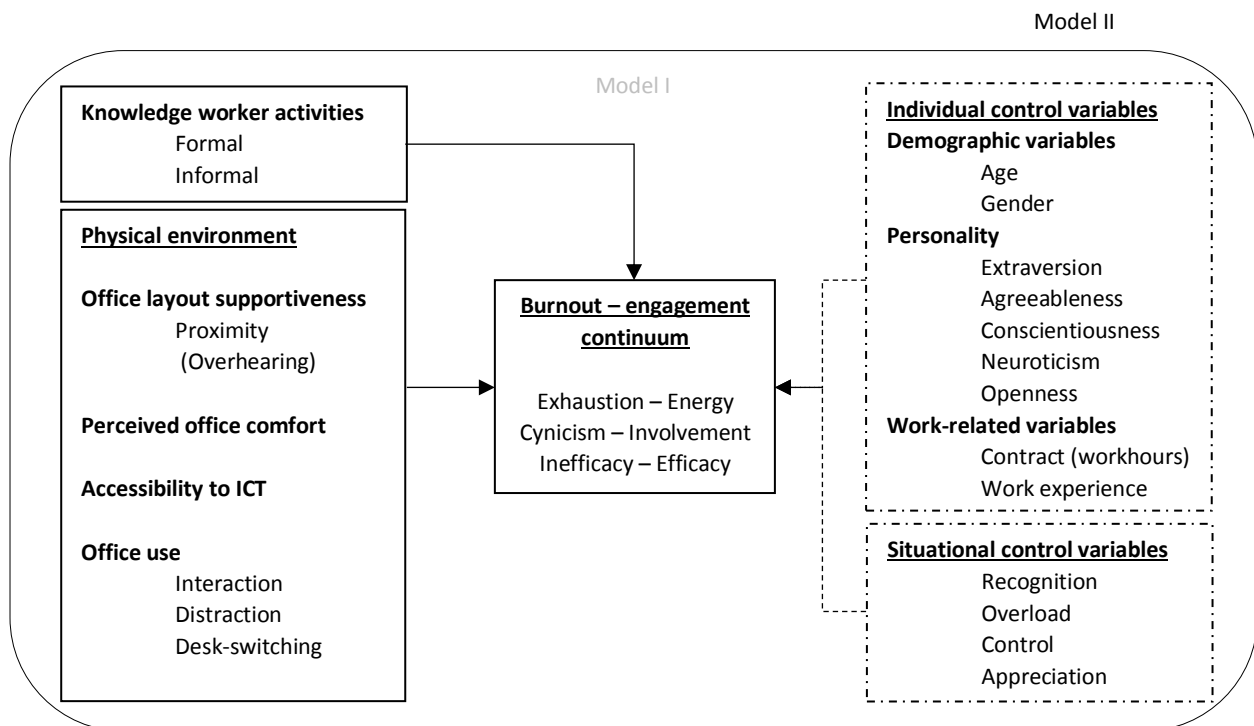


Figure 7.2: Multiple regression analyses – model II

The following sections (Section 7.1.2.1 to Section 7.1.2.3) will elaborate on the regression models, for which each model is discussed separately, after which an overview of the regression equations is provided. These regression equations will be used for the data analyses in Section 7.2.

7.1.2.1. Multiple regression analyses for the individual strain (exhaustion – energy)

This section elaborates on the first two MRAs that determine the effect of the independent variables on the position of workers on the individual strain dimension.

Model I

The first model is used to determine the effect of control variables on the position of workers on the individual strain dimension (Figure 7.3). An overview of the input variables, regression equation and an elaboration of its specific components can be found in table 7.1.

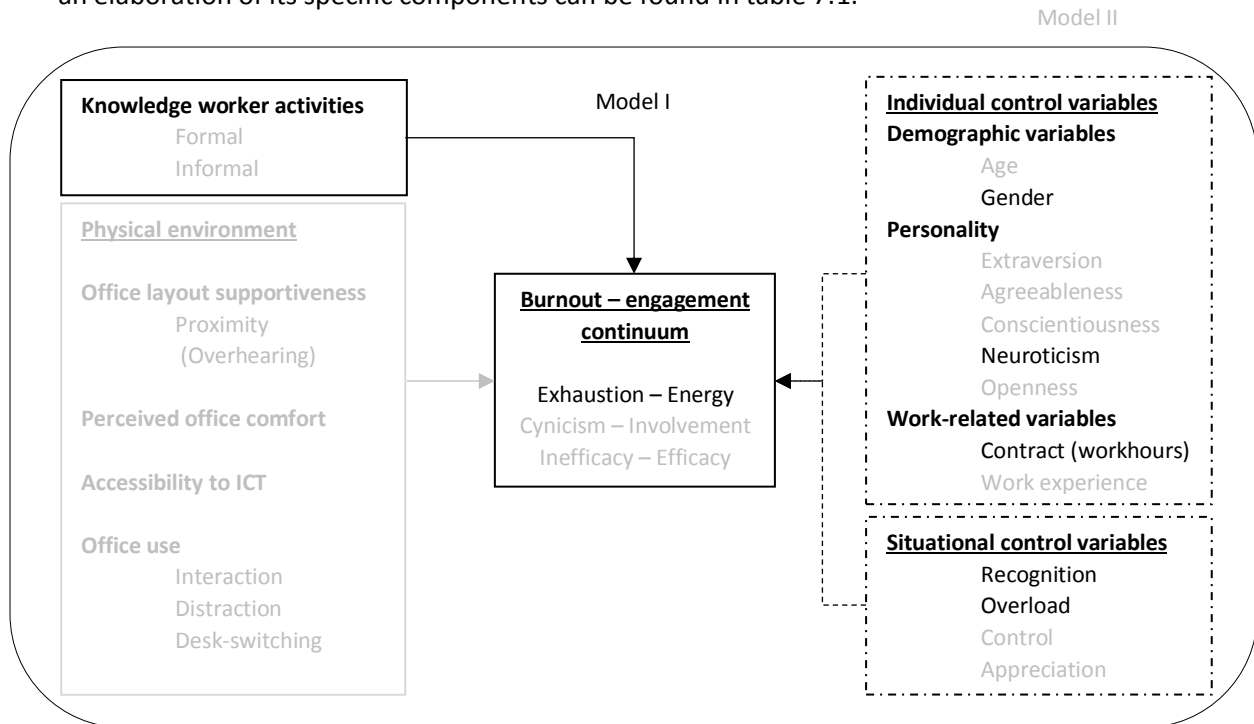


Figure 7.3: Multiple regression analyses model I – individual strain dimension

Table 7.1: MRA – Model I: individual strain dimension

Variables	
Independent variables	Recognition, overload, neuroticism, male, workhours
Dependent variable	Individual strain dimension
Regression equation	
$Y_i = \beta_0 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{16} X_{16} + \beta_{19} X_{19} + \beta_{21} X_{21} + \varepsilon_i$	Y_i = dependent variable I (individual strain dimension) β_0 = constant (intercept) β_{i-n} = partial regression coefficient of independent variables X_{i-n} = independent variable i ε_i = error term for dependent variable i
$Y_i = \beta_0 + \beta_9 * \text{recognition} + \beta_{10} * \text{overload} + \beta_{16} * \text{neuroticism} + \beta_{19} * \text{male} + \beta_{21} * \text{workhours} + \varepsilon_i$	Y_i = dependent variable I (individual strain dimension) β_0 = constant (intercept) β_{i-n} = partial regression coefficient of recognition, overload, neuroticism, male, workhours ε_i = error term for individual strain dimension

Model II

The second model is used to determine the effect of the physical workplace characteristics on the position of workers on the individual strain dimension (Figure 7.4). An overview of the input variables, regression equation and an elaboration of its specific components can be found in table 7.2.

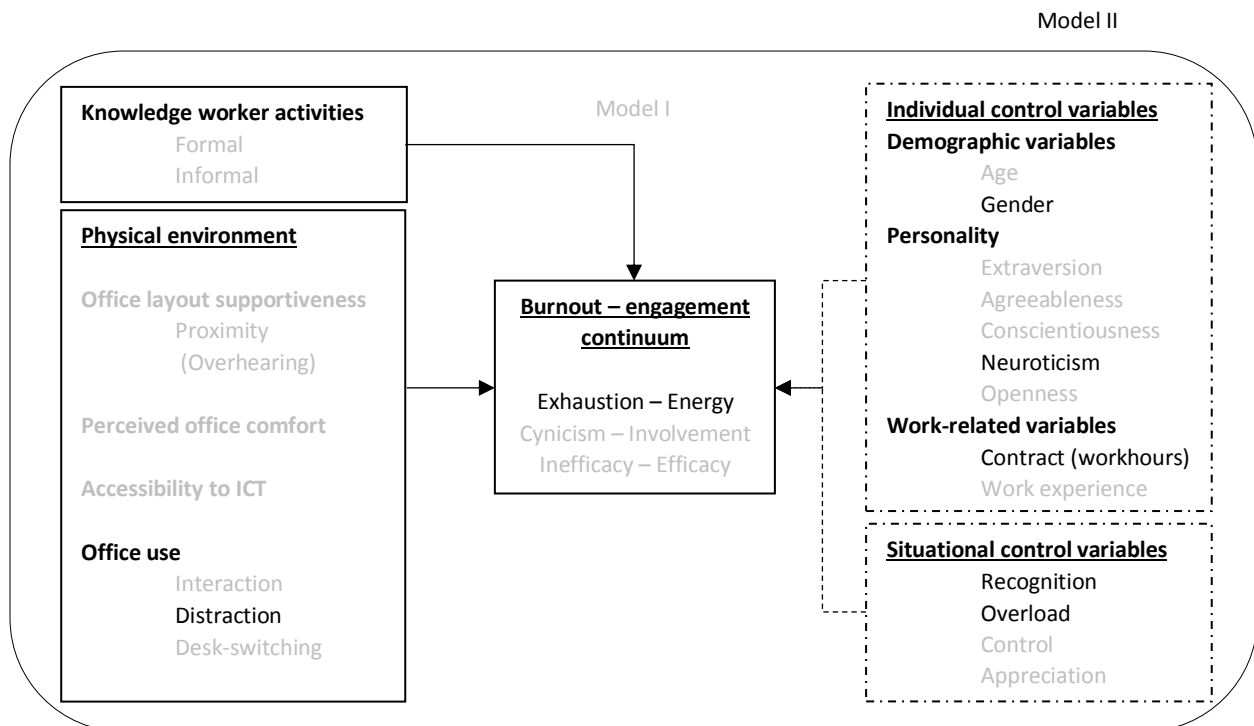


Figure 7.4: Multiple regression analyses model II – individual strain dimension

Table 7.2: MRA – Model II: individual strain dimension

Variables	
Independent variables	Distraction, recognition, overload, neuroticism, male, workhours
Dependent variable	Individual strain dimension
Regression equation	
$Y_i = \beta_0 + \beta_5 X_5 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{16} X_{16} + \beta_{19} X_{19} + \beta_{21} X_{21} + \varepsilon_i$	Y_i = dependent variable I (individual strain dimension) β_0 = constant (intercept) β_{i-n} = partial regression coefficient of independent variables X_{i-n} = independent variable i ε_i = error term for dependent variable i
$Y_i = \beta_0 + \beta_5 * \text{distraction} + \beta_9 * \text{recognition} + \beta_{10} * \text{overload} + \beta_{16} * \text{neuroticism} + \beta_{19} * \text{male} + \beta_{21} * \text{workhours} + \varepsilon_i$	Y_i = dependent variable I (individual strain dimension) β_0 = constant (intercept) β_{i-n} = partial regression coefficient of distraction, recognition, overload, neuroticism, male, workhours ε_i = error term for individual strain dimension

7.1.2.2. Multiple regression analyses for the interpersonal strain (cynicism – involvement)

This section elaborates on the two MRAs that determine the effect of the independent variables on the position of workers on the interpersonal strain dimension.

Model I

The first model is used to determine the effect of control variables on the position of workers on the interpersonal strain dimension (Figure 7.5). An overview of the input variables, regression equation and an elaboration of its specific components can be found in table 7.3.

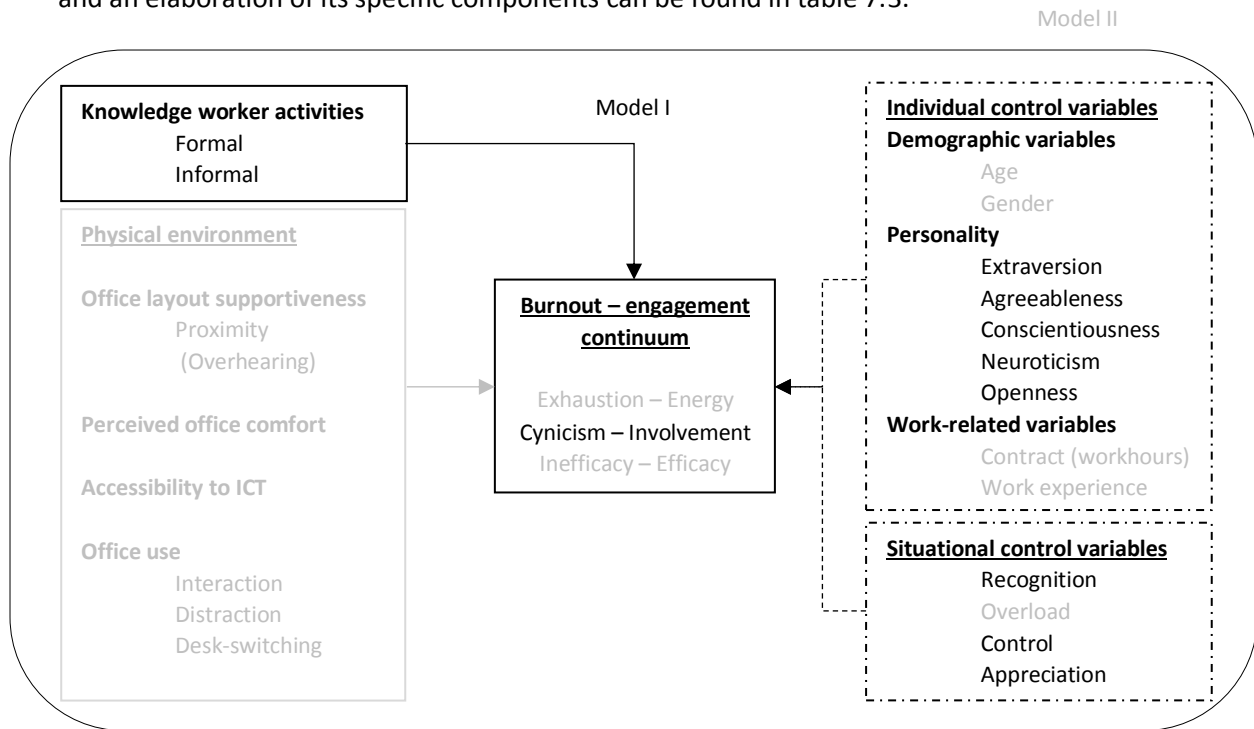


Figure 7.5: Multiple regression analyses model I – interpersonal strain dimension

Table 7.3: MRA – Model I: interpersonal strain dimension

Variables	
Independent variables	Formal interaction, informal interaction, recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness
Dependent variable	Interpersonal strain dimension
Regression equation	
$Y_i = \beta_0 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \beta_{17} X_{17} + \varepsilon_i$	$Y_i = \text{dependent variable I (interpersonal strain dimension)}$ $\beta_0 = \text{constant (intercept)}$ $\beta_{i-n} = \text{partial regression coefficient of independent variables}$ $X_{i-n} = \text{independent variable i}$ $\varepsilon_i = \text{error term for dependent variable i}$
$Y_i = \beta_0 + \beta_7 * \text{formal interaction} + \beta_8 * \text{informal interaction} + \beta_9 * \text{recognition} + \beta_{11} * \text{control} + \beta_{12} * \text{appreciation} + \beta_{13} * \text{extraversion} + \beta_{14} * \text{agreeableness} + \beta_{15} * \text{conscientiousness} + \beta_{16} * \text{neuroticism} + \beta_{17} * \text{openness} + \varepsilon_i$	$Y_i = \text{dependent variable I (interpersonal strain dimension)}$ $\beta_0 = \text{constant (intercept)}$ $\beta_{i-n} = \text{partial regression coefficient of formal interaction, informal interaction, recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness}$ $\varepsilon_i = \text{error term for interpersonal strain dimension}$

Model II

The second model is used to determine the effect of the physical workplace characteristics on the position of workers on the interpersonal strain dimension (Figure 7.6). An overview of the input variables, regression equation and an elaboration of its specific components can be found in table 7.4.

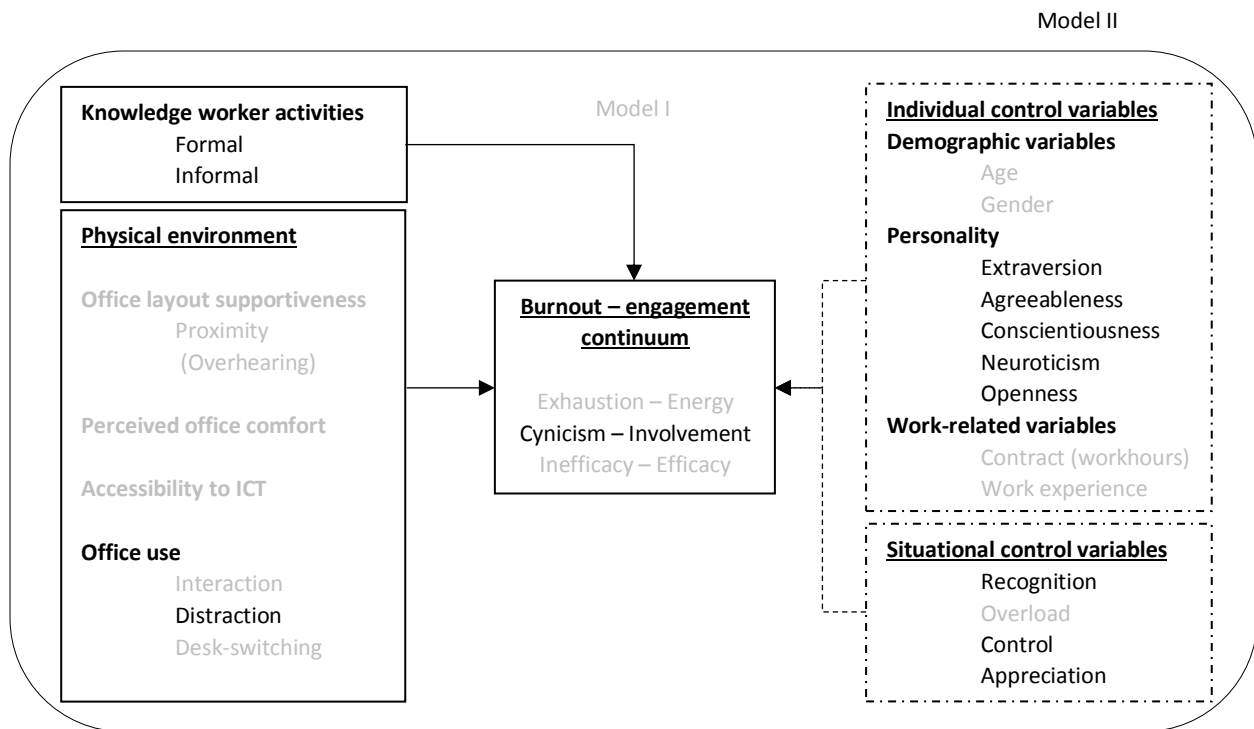


Figure 7.6: Multiple regression analyses model II – interpersonal strain dimension

Table 7.4: MRA – Model II: interpersonal strain dimension

Variables	
Independent variables	Distraction, formal interaction, informal interaction, recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness
Dependent variable	Interpersonal strain dimension
Regression equation	
$Y_i = \beta_0 + \beta_5 X_5 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \beta_{17} X_{17} + \varepsilon_i$	$Y_i = \text{dependent variable I (interpersonal strain dimension)}$ $\beta_0 = \text{constant (intercept)}$ $\beta_{i-n} = \text{partial regression coefficient of independent variables}$ $X_{i-n} = \text{independent variable i}$ $\varepsilon_i = \text{error term for dependent variable i}$
$Y_i = \beta_0 + \beta_5 * \text{distraction} + \beta_7 * \text{formal interaction} + \beta_8 * \text{informal interaction} + \beta_9 * \text{recognition} + \beta_{11} * \text{control} + \beta_{12} * \text{appreciation} + \beta_{13} * \text{extraversion} + \beta_{14} * \text{agreeableness} + \beta_{15} * \text{conscientiousness} + \beta_{16} * \text{neuroticism} + \beta_{17} * \text{openness} + \varepsilon_i$	$Y_i = \text{dependent variable I (interpersonal strain dimension)}$ $\beta_0 = \text{constant (intercept)}$ $\beta_{i-n} = \text{partial regression coefficient of distraction, formal interaction, informal interaction, recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness}$ $\varepsilon_i = \text{error term for interpersonal strain dimension}$

7.1.2.3. Multiple regression analyses for the self-evaluation strain (inefficacy – efficacy)

This section elaborates on the two MRAs that determine the effect of the independent variables on the position of workers on the self-evaluation strain dimension.

Model I

The first model is used to determine the effect of control variables on the position of workers on the self-evaluation strain dimension (Figure 7.7). An overview of the input variables, regression equation and an elaboration of its specific components can be found in table 7.5.

Model II

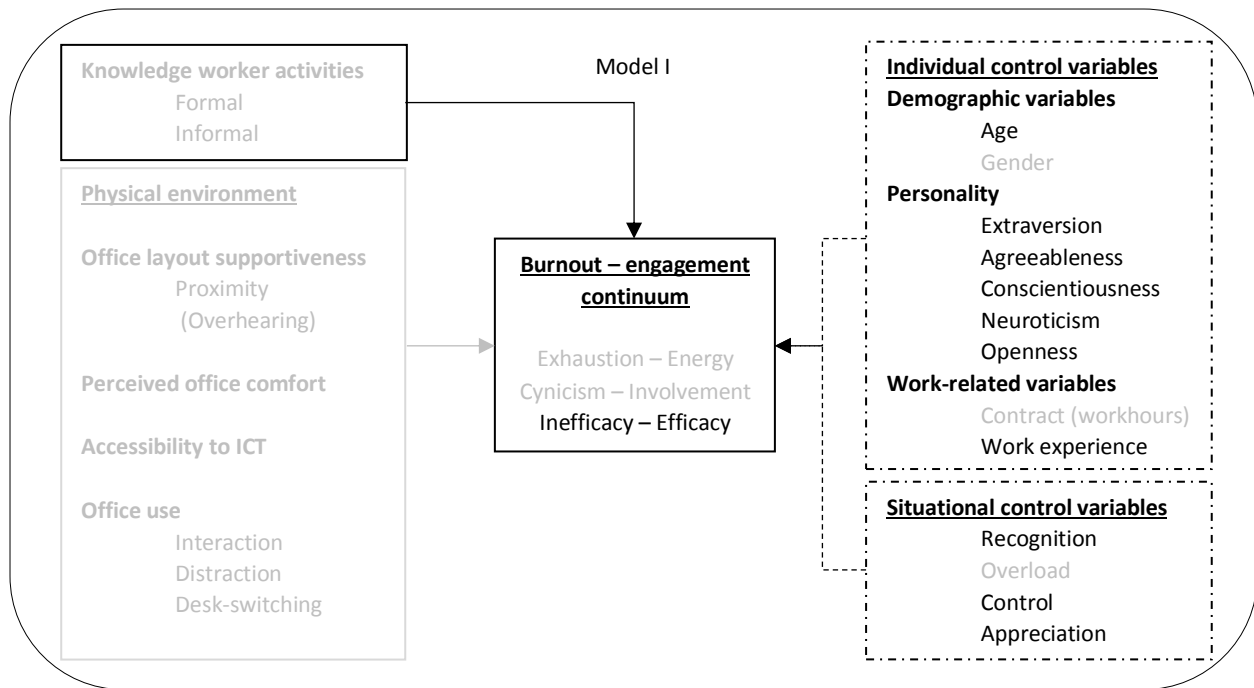


Figure 7.7: Multiple regression analyses model I – self-evaluation strain dimension

Table 7.5: MRA – Model I: self-evaluation strain dimension

Variables	
Independent variables	Recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness, age, work experience
Dependent variable	Self-evaluation strain dimension
Regression equation	
$Y_i = \beta_0 + \beta_9 X_9 + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \beta_{17} X_{17} + \beta_{18} X_{18} + \beta_{22} X_{22} + \varepsilon_i$	$Y_i = \text{dependent variable I (self-evaluation strain dimension)}$ $\beta_0 = \text{constant (intercept)}$ $\beta_{i-n} = \text{partial regression coefficient of independent variables}$ $X_{i-n} = \text{independent variable i}$ $\varepsilon_i = \text{error term for dependent variable i}$
$Y_i = \beta_0 + \beta_9 * \text{recognition} + \beta_{11} * \text{control} + \beta_{12} * \text{appreciation} + \beta_{13} * \text{extraversion} + \beta_{14} * \text{agreeableness} + \beta_{15} * \text{conscientiousness} + \beta_{16} * \text{neuroticism} + \beta_{17} * \text{openness} + \beta_{18} * \text{age} + \beta_{22} * \text{work experience} + \varepsilon_i$	$Y_i = \text{dependent variable I (self-evaluation strain dimension)}$ $\beta_0 = \text{constant (intercept)}$ $\beta_{i-n} = \text{partial regression coefficient of recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness, age, work experience}$ $\varepsilon_i = \text{error term for self-evaluation strain dimension}$

Model II

The second model is used to determine the effect of the physical workplace characteristics on the position of workers on the self-evaluation strain dimension (Figure 7.8). An overview of the input variables, regression equation and an elaboration of its specific components can be found in table 7.6.

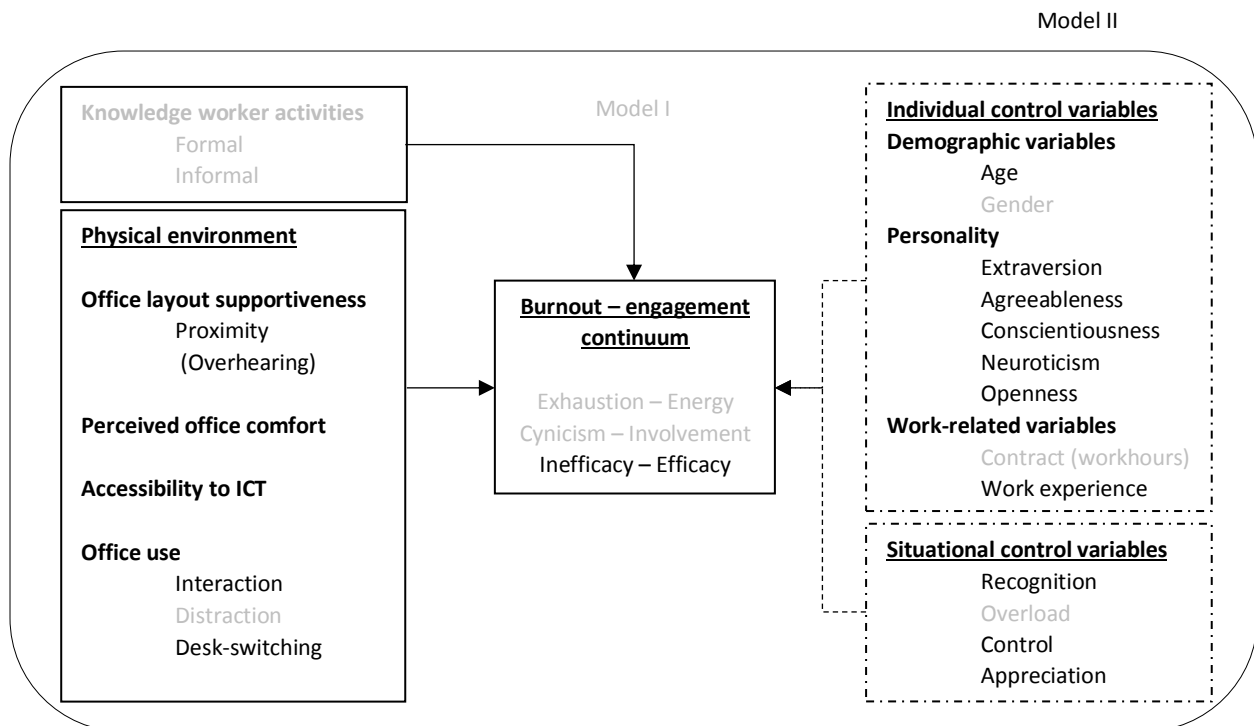


Figure 7.8: Multiple regression analyses model II – self-evaluation strain dimension

Table 7.6: MRA – Model II: self-evaluation strain dimension

Variables	
Independent variables	Proximity (overhearing), perceived office comfort, accessibility ICT, interaction, desk-switching, recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness, age, work experience
Dependent variable	Self-evaluation strain dimension
Regression equation	
$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_6 X_6 + \beta_9 X_9 + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \beta_{17} X_{17} + \beta_{18} X_{18} + \beta_{22} X_{22} + \varepsilon_i$	Y_i = dependent variable I (self-evaluation strain dimension) β_0 = constant (intercept) β_{i-n} = partial regression coefficient of independent variables X_{i-n} = independent variable i ε_i = error term for dependent variable i
$Y_i = \beta_0 + \beta_1 * \text{overhearing in close proximity} + \beta_2 * \text{perceived office comfort} + \beta_3 * \text{accessibility ICT} + \beta_4 * \text{interaction} + \beta_6 * \text{desk – switching} + \beta_9 * \text{recognition} + \beta_{11} * \text{control} + \beta_{12} * \text{appreciation} + \beta_{13} * \text{extraversion} + \beta_{14} * \text{agreeableness} + \beta_{15} * \text{conscientiousness} + \beta_{16} * \text{neuroticism} + \beta_{17} * \text{openness} + \beta_{18} * \text{age} + \beta_{22} * \text{work experience} + \varepsilon_i$	Y_i = dependent variable I (self-evaluation strain dimension) β_0 = constant (intercept) β_{i-n} = partial regression coefficient of overhearing in close proximity (distraction), perceived office comfort, accessibility ICT, interaction, desk-switching, recognition, control, appreciation, extraversion, agreeableness, conscientiousness, neuroticism, openness, age, work experience ε_i = error term for self-evaluation strain dimension

7.2. Data analyses

Previous sections (Section 7.1.2.1 to Section 7.1.2.3) have elaborated on the regression models and the corresponding regression equations. In this section, the results of the multiple regression analyses are elaborated for each dimension of the burnout – engagement continuum separately. For each dimension, the approach and results are discussed in detailed manner, while the assumptions (Section 4.4.2) are being checked and validated. Significant levels of 5% ($p < .05$; green) and 10% ($0 < .10$; yellow) were used.

7.2.1. Multiple regression analyses: individual strain (exhaustion – energy)

Two models were tested to determine the effect of the independent variables on the position of workers on the individual strain dimension. The results of the MRAs for the individual strain dimension are shown in Table 7.7 and Figure 7.9.

Table 7.7: MRAs individual strain dimension

Dependent variable		Individual strain (exhaustion – energy)							
Regression model		I				II			
Statistics		β_s	t	Sig.	VIF	β_s	t	Sig.	VIF
Constant		7,165	20,373	,000		6,936	19,511	,000	
Situational variables	Recognition	,128	1,814	,071	1,126	,121	1,747	,082	1,127
	Overload	-,241	-3,266	,001	1,236	-,227	-3,123	,002	1,242
Personality	Neuroticism	-,153	-2,264	,025	1,033	-,130	-1,946	,053	1,049
Socio-demographics	Male	-,111	-1,484	,139	1,279	-,116	-1,575	,117	1,280
Work-related variables	Workhours	-,145	-1,924	,056	1,279	-,103	-1,362	,175	1,334
Office use	Distraction					-,186	-2,727	,007	1,088
R^2_{adj}		,193				,221			
Sig.		,000				,000			
F		4.658				7.438			
Average VIF		.99				1,19			
N		184				184			
Method		Enter				Enter			

Prior to analysing the results, the assumptions (Section 4.3.2.) are checked and validated. As indicated before, the number of cases (e.g. respondents) in the MRA has to be sufficiently large to obtain results that can be generalised with other samples. The sample size for these specific MRAs was 184 respondents. Based on the sample size, a maximum total of 16 independent variables ($(184 - 50) / 8$) can be entered into the models. The bivariate analyses (Chapter 6) already showed that only five (model I) and six (model II) variables, respectively, had a significant relationship with the individual strain dimension. The models contain one dummy variable (gender: male). Accordingly, it can be concluded that the sample size is sufficiently large.

No signs of multicollinearity or singularity were found in the correlation matrix. The VIF-values did not exceed the threshold of 10, while the average VIF was not substantially larger than 1 ($VIF = 1,19$). The tolerance values were all greater than .2, indicating no cause for concern.

According to the residual statistics in SPSS, model II includes one outlier that just exceeds the threshold (range between -3,3 and 3,3). A closer look at the casewise diagnostics shows that case 79 has a standardised residual of -3.316. After further inspection of this specific case, it has been decided to take no further action.

Normality, linearity, and homoscedasticity are validated by means of the figures shown in Appendix N. The histogram (Figure N.1.1) shows that the residuals are approximately normally distributed. The normal p-p plot (Figure N.1.2) shows a straight line and the scatterplot (Figure N.1.3) is clustered around zero.

As can be seen in Table 7.7, the first model includes only control variables for which four of the potential five relationships with the individual strain dimension are significant. Notably, the dichotomous variable male (i.e. gender) no longer has a significant relationship with the individual strain dimension. Maslach et al., (2001), on the other hand, proposed that males seem to score higher on the cynicism component of burnout, whereas females appear to score higher on the exhaustion component of burnout.

The coefficient for recognition with the individual strain dimension is positive ($\beta = .128$, $n = 184$, $p = .071$). This implies that an increase in recognition is related to increased feelings of energy. Maslach and Leiter (2008) argued that appropriate recognition generally increases the perceived value of both the work and the workers.

The coefficient for overload with the individual strain dimension is negative ($\beta = -.241$, $n = 184$, $p = .001$). This implies that an increase in overload, or excessive workload, is related to decreased feelings of energy, hence increased feelings of exhaustion. Not surprisingly, Maslach and Leiter (1997) already conceptualised an *engaged profile* (Section 2.2.1) that included sustainable workload two decades ago. Even before, Karasek et al. (1981) reported similar findings on overload (or workload).

The coefficient for neuroticism with the individual strain dimension is negative ($\beta = -.153$, $n = 184$, $p = .025$). This implies that neurotic workers are more likely to feel less energetic. It is not that surprising that, out of all personality traits, neuroticism showed a significant relationship with the individual strain dimension. Alarcon et al. (2009), for example, already stated that emotional (in)stability (*neuroticism*) appeared to be the most important predictor of the exhaustion component of burnout.

Similar to overload and neuroticism, the coefficient for workhours is negative ($\beta = -.145$, $n = 184$, $p = .056$). This implies that an increase in workhours is related to decreased feelings of energy. This result is perfectly explainable since overtime increases the length of a professional workweek, thereby increasing workload and feelings of exhaustion.

The β -values indicate the unique contribution of variables in predicting the outcome variable (individual strain dimension). In the first model, overload seems to be the strongest predictor of the individual strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret. The model accounts for 19,3% of variance (R^2_{adj}) in the individual strain dimension. Seemingly, there is some overlap in explained variance, indicating that other variables that affect the individual strain dimension have not been taken into account.

The second model includes all variables (that showed a significant relationship throughout the bivariate analyses) to determine how well the physical workplace characteristics predict the position of workers on the individual strain dimension. Surprisingly, the second model indicates that only four of the potential six relationships with the individual strain dimension are significant.

The coefficient for recognition with the individual strain dimension is positive ($\beta = .121$, $n = 184$, $p = .082$). The effect of recognition on the individual strain dimension, however, is slightly weaker than it was in the first model. This seems logical given the addition of the physical workplace characteristics.

The same results imply for overload and neuroticism which both have slightly weaker effects on the individual strain dimension, as a result of adding the physical workplace characteristics. More specifically, the coefficient for overload and neuroticism with the individual strain dimension remain negative, but decreased to $\beta = -.227$, $n = 184$, $p = .002$ (*overload*) and $\beta = -.130$, $n = 184$, $p = .053$ (*neuroticism*).

Other than the first model, workhours (length of professional workweek) no longer shows a significant relationship with the individual strain dimension ($p = .175$). On the contrary, distraction does show a significant negative relationship with the individual strain dimension ($\beta = -.186$, $n = 184$, $p = .007$). This implies that an increase in distraction (e.g. interruptions, crowding, noise) is related to decreased feelings of energy, hence stimulates exhaustion. It should be kept in mind, however, that one person's distraction is another person's interaction (e.g. Haynes & Price, 2004). Moreover, distraction, or disturbance, determines the degree to which social interaction is allowed, or even stimulated. Olson (2002), among others, emphasised the importance of being able to work distraction-free. The challenge for managers responsible for managing office environments, therefore, is maximising the interaction component, whilst at the same time minimising the distraction component.

Similar to the first model, overload seems to be the strongest predictor of the individual strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret. The model accounts for 22,1% of variance (R^2_{adj}) in the individual strain dimension. Seemingly, there is some overlap in explained variance, indicating that other variables that affect the individual strain dimension have not been taken into account.

In conclusion, it can be argued that the physical workspace accounts for 2,8% (22,1% - 19,3%) of variance in the individual strain dimension, when controlled for the control variables (e.g. situational variables, personality, socio-demographics, and work-related variables). Moreover, the results imply that the physical workplace has a small significant contribution to predicting the individual strain of exhaustion and energy. Instead, work characteristics and personal characteristics are more strongly related to the individual strain dimension.

7.2.2. Multiple regression analyses: interpersonal strain (cynicism – involvement)

Two models were tested to determine the effect of the independent variables on the position of workers on the interpersonal strain dimension. The results of the MRAs for the interpersonal strain dimension are shown in Table 7.8 and Figure 7.10.

Table 7.8: MRAs interpersonal strain dimension

Dependent variable		Interpersonal strain (cynicism – involvement)							
Regression model		I				II			
Statistics		β_s	t	Sig.	VIF	β_s	t	Sig.	VIF
Constant		3,132	4,331	,000		3,260	4,497	,000	
Activities	Formal	,225	3,245	,001	1,151	,221	3,203	,002	1,152
	Informal	,089	1,311	,192	1,119	,068	,973	,332	1,166
Situational variables	Recognition	,186	2,400	,017	1,449	,180	2,322	,021	1,453
	Control	,031	,413	,680	1,377	,038	,501	,617	1,381
	Appreciation	-,125	-1,456	,147	1,782	-,136	-1,584	,115	1,794
Personality	Extraversion	,140	2,021	,045	1,145	,134	1,942	,054	1,148
	Agreeableness	,077	1,094	,275	1,196	,068	,959	,339	1,205
	Conscientiousness	,059	,872	,385	1,110	,067	,987	,325	1,116
	Neuroticism	-,059	-,865	,388	1,107	-,048	-,702	,484	1,119
	Openness	,152	2,295	,023	1,047	,152	2,313	,022	1,047
Office use	Distraction					-,106	-1,567	,119	1,101
R^2_{adj}		,238				,244			
Sig.		,000				,000			
F		3,192				3,021			

Average VIF	1,13	1,24
N	184	184
Method	Enter	Enter

Prior to analysing the results, the assumptions (Section 4.3.2.) are checked and validated. The sample size for these specific MRAs was 184 respondents. Based on the sample size, a maximum total of 16 independent variables $((184 - 50) / 8)$ can be entered into the models. The bivariate analyses (Chapter 6) already showed that only ten (model I) and eleven (model II) variables, respectively, had a significant relationship with the interpersonal strain dimension, while the models contain no dummy variables. Therefore, it can be concluded that the sample size is sufficiently large.

No signs of multicollinearity or singularity were found in the correlation matrix. The VIF-values did not exceed the threshold of 10, while the average VIF was not substantially larger than 1 (VIF = 1,24). The tolerance values were all greater than .2, indicating no cause for concern.

According to the residual statistics in SPSS, no outliers are found in the MRAs. The largest standardised residual is -2,593.

Normality, linearity, and homoscedasticity are validated by means of the figures shown in Appendix N. The histogram (Figure N.2.1) shows that the residuals are approximately normally distributed. The normal p-p plot (Figure N.2.2) shows a straight line and the scatterplot (Figure N.2.3) is clustered around zero.

As can be seen in Table 7.8, the first model includes only control variables for which four of the potential ten relationships with the interpersonal strain dimension are significant. Notably, informal interaction, control, appreciation, agreeableness, conscientiousness, and neuroticism no longer have a significant relationship with the interpersonal strain dimension. Based on the literature, however, it was expected to find a positive relationship between informal interaction (e.g. De Been et al., 2016), control (e.g. Maslach et al., 2001; Maslach & Leiter, 2008), agreeableness (e.g. Schaufeli & Enzmann, 1998; Maslach et al., 2001), conscientiousness (e.g. Schaufeli & Enzmann, 1998; Maslach et al., 2001), respectively, and the interpersonal strain dimension. In addition, it was expected to find a negative relationship between appreciation (e.g. Maslach et al., 2001; Maslach & Leiter, 2008) and neuroticism (e.g. Schaufeli & Enzmann, 1998; Maslach et al., 2001), respectively, and the interpersonal strain dimension.

The coefficient for formal interaction with the interpersonal strain dimension is positive ($\beta = .225$, $n = 184$, $p = .001$). This implies that an increase in formal interaction is related to increased feelings of involvement. This result is perfectly explainable since formal interaction (e.g. planned meetings, collaboration, participation in organisational decision-making) is an excellent way of communicating insights on an abstract level. In addition, literature suggest a strong relationship with increased professional efficacy (e.g. Maslach & Leiter, 2008), but no such findings was found throughout this study.

The coefficient for recognition with the interpersonal strain dimension is positive ($\beta = .186$, $n = 184$, $p = .017$). This implies that workers who receive appropriate recognition are more likely to feel involved. Maslach and Leiter (2008) argued that appropriate recognition generally increases the perceived value of both the work and the workers. Not surprisingly, Maslach and Leiter (1997) already conceptualised an *engaged profile* (Section 2.2.1) that included appropriate recognition two decades ago.

The coefficient for extraversion with the interpersonal strain dimension is positive ($\beta = .140$, $n = 184$, $p = .045$). This implies that extravert workers are more likely to feel involved. Extraverts show positive emotions, frequent personal interactions and a high need for stimulation, which may be particularly helpful for mobilising support and asking for feedback (Bakker et al., 2013). These

characteristics are particularly associated with the involvement and efficacy components of engagement.

The coefficient for openness with the interpersonal strain dimension is positive ($\beta = .152$, $n = 184$, $p = .023$). This implies that workers who have an open mind for new experiences are more likely to feel involved. Alarcon et al. (2009), for example, found a positive relationship between openness (to new experiences) and personal efficacy. Although this relationship did show significant results in the bivariate analyses, openness seems to be more associated with the involvement component.

The β -values indicate the unique contribution of variables in predicting the outcome variable (interpersonal strain dimension). In the first model, formal interaction seems to be the strongest predictor of the interpersonal strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret. The model accounts for 23,8% of variance (R^2_{adj}) in the interpersonal strain dimension. Seemingly, there is some overlap in explained variance, indicating that other variables that affect the interpersonal strain dimension have not been taken into account.

The second model includes all variables (that showed a significant relationship throughout the bivariate analyses) to determine how well the physical workplace characteristics predict the position of workers on the interpersonal strain dimension. Surprisingly, the second model indicates that only three of the potential eleven relationships with the interpersonal strain dimension are significant.

The coefficient for formal interaction with the interpersonal strain dimension is positive ($\beta = .221$, $n = 184$, $p = .002$). The effect of formal interaction on the interpersonal strain dimension, however, is slightly weaker than it was in the first model. This seems logical given the addition of the physical workplace characteristics.

The same results imply for recognition, extraversion, and openness which all have slightly weaker effects on the interpersonal strain dimension, as a result of adding the physical workplace characteristics. More specifically, the coefficient for recognition, extraversion, and openness with the interpersonal strain dimension remain positive, but decreased to $\beta = .180$, $n = 184$, $p = .021$ (recognition), $\beta = .134$, $n = 184$, $p = .054$ (extraversion), and $\beta = .152$, $n = 184$, $p = .022$ (openness).

Similar to the first model, formal interaction seems to be the strongest predictor of the interpersonal strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret. The model accounts for 24,4% of variance (R^2_{adj}) in the interpersonal strain dimension. Seemingly, there is some overlap in explained variance, indicating that other variables that affect the interpersonal strain dimension have not been taken into account.

In conclusion, it can be argued that the physical workspace accounts for 0,6% (24,4% - 23,8%) of variance in the interpersonal strain dimension, when controlled for the control variables. This is shown by the fact that non-physical workplace characteristic showed a significant relationship with the interpersonal strain dimension. Moreover, the results imply that the physical workplace has no significant contribution to predicting the interpersonal strain of cynicism and involvement. Instead, work characteristics and personal characteristics are more strongly related to the interpersonal strain dimension.

7.2.3. Multiple regression analyses: self-evaluation strain (inefficacy – efficacy)

Two models were tested to determine the effect of the independent variables on the position of workers on the self-evaluation strain dimension. The results of the MRAs for the self-evaluation strain dimension are shown in Table 7.9 and Figure 7.11.

Table 7.9: MRAs self-evaluation strain dimension

Dependent variable		Self-evaluation strain (inefficacy – efficacy)							
Regression model		I				II			
Statistics		β_s	t	Sig.	VIF	β_s	t	Sig.	VIF
Constant		4,559	8,535	,000		4,740	6,816	,000	
Situational variables	Recognition	-,041	-,542	,589	1,469	-,059	-,775	,440	1,539
	Control	-,220	-2,990	,003	1,392	-,199	2,700	,008	1,424
	Appreciation	-,107	-1,316	,190	1,684	-,114	1,396	,165	1,744
Personality	Extraversion	,137	2,035	,043	1,160	,109	1,597	,112	1,210
	Agreeableness	-,006	-,095	,924	1,177	-,048	-,693	,489	1,249
	Conscientiousness	,121	1,849	,066	1,103	,142	2,140	,034	1,147
	Neuroticism	-,173	-2,605	,010	1,138	-,181	-2,708	,007	1,175
	Openness	,105	1,563	,120	1,159	,103	1,540	,125	1,180
Socio-demographics	Age	-,023	-,256	,799	2,045	,027	,300	,764	2,168
Work-related variables	Work experience	,285	3,246	,001	1,978	,237	2,603	,001	2,165
Office Layout supportiveness	Proximity (overhearing)					-,033	-,496	,620	1,182
Perceived office comfort	Perceived office comfort					-,019	-,262	,793	1,314
Accessibility ICT	Accessibility ICT					,032	,467	,641	1,265
Office use	Interaction					,110	1,644	,102	1,162
	Desk-switching					,129	1,777	,077	1,375
R ² _{adj}		,294				,308			
Sig.		,000				,000			
F		10,536				6,777			
Average VIF		1,02				1,52			
N		182				182			
Method		Enter				Enter			

Prior to analysing the results, the assumptions (Section 4.3.2.) are checked and validated. The sample size for these specific MRAs was 182 respondents. Based on the sample size, a maximum total of 16 independent variables $((182 - 50) / 8)$ can be entered into the models. The bivariate analyses (Chapter 6) already showed that only ten (model I) and fifteen (model II) variables, respectively, had a significant relationship with the self-evaluation strain dimension, while the models contain no dummy variables. Therefore, it can be concluded that the sample size is sufficiently large.

No signs of multicollinearity or singularity were found in the correlation matrix. The VIF-values did not exceed the threshold of 10, while the average VIF was not substantially larger than 1 (VIF = 1,52). The tolerance values were all greater than .2, indicating no cause for concern.

According to the residual statistics in SPSS, no outliers are found in the MRAs. The largest standardised residual is -2,221.

Normality, linearity, and homoscedasticity are validated by means of the figures shown in Appendix N. The histogram (Figure N.3.1) shows that the residuals are approximately normally distributed. The normal p-p plot (Figure N.3.2) shows a straight line and the scatterplot (Figure N.3.3) is clustered around zero.

As can be seen in Table 7.9, the first model includes only control variables for which five of the potential ten relationships with the self-evaluation strain dimension are significant. Notably, recognition, appreciation, agreeableness, openness, and age no longer have a significant relationship

with the self-evaluation strain dimension. Based on the literature, however, it was expected to find a negative relationship between recognition (e.g. Maslach et al., 2001; Maslach & Leiter, 2008), appreciation (e.g. Maslach et al., 2001; Maslach & Leiter, 2008), agreeableness (e.g. Schaufeli & Enzmann, 1998; Maslach et al., 2001), age (e.g. Maslach et al., 2001), respectively, and the self-evaluation strain dimension. In addition, it was expected to find a positive relationship between openness (e.g. Schaufeli & Enzmann, 1998; Maslach et al., 2001) and the interpersonal strain dimension.

The coefficient for control with the self-evaluation strain dimension is negative ($\beta = -.220$, $n = 182$, $p = .003$). This implies that an increase in control (e.g. resources, authority, participation) is related to decreased feelings of professional efficacy. Although this is very counter-intuitive (e.g. Karasek et al., 1981), a possible explanation might be that increased control results in role ambiguity (absence of direction in work). According to Maslach et al. (2001), role ambiguity is associated with the inefficacy component of burnout. Another explanation might be that great control stimulates proactive behaviour such as job crafting, which, in turn, might result in extra workload.

The coefficient for extraversion with the self-evaluation strain dimension is positive ($\beta = .137$, $n = 182$, $p = .043$). This implies that extravert workers are more likely to feel efficient. Extraverts show positive emotions, frequent personal interactions and a high need for stimulation, which may be particularly helpful for mobilising support and asking for feedback (Bakker et al., 2013). Accordingly, they found that extraversion is the most important predictor of personal accomplishment, or efficacy (Alarcon et al., 2009; see also Bakker et al., 2013).

The coefficient for conscientiousness with the self-evaluation strain dimension is positive ($\beta = .121$, $n = 182$, $p = .066$). This implies that conscientious workers, or workers who tend to do a thorough job, are more likely to feel efficient. Evidently, the results match the expectations.

Similar to control, the coefficient for neuroticism with the self-evaluation strain dimension is negative ($\beta = -.173$, $n = 182$, $p = .010$). This implies that neurotic workers are more likely to feel less efficient. Although prior research primarily focussed on the relationship between neuroticism and the individual strain dimension, the relationship between neuroticism and the self-evaluation strain dimension seems to be consistent as well.

The coefficient for work experience with the self-evaluation strain dimension is positive ($\beta = .285$, $n = 182$, $p = .001$). This implies that more experienced workers are more likely to feel efficient. Although prior research into this relationship seems scarce, the result is perfectly explainable. Maslach et al. (2001), for example, argue that age is confounded with work experience, suggesting that burnout appears to be more of a risk earlier in one's career. Besides, after several years of work experience, work becomes some sort of a routine. Workers often feel very efficient with routine work.

The β -values indicate the unique contribution of variables in predicting the outcome variable (self-evaluation strain dimension). In the first model, work experience seems to be the strongest predictor of the self-evaluation strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret. The model accounts for 29,4% of variance (R^2_{adj}) in the self-evaluation strain dimension. Seemingly, there is some overlap in explained variance, indicating that other variables that affect the self-evaluation strain dimension have not been taken into account.

The second model includes all variables (that showed a significant relationship throughout the bivariate analyses) to determine how well the physical workplace characteristics predict the position of workers on the self-evaluation strain dimension. Surprisingly, the second model indicates that only five of the potential fifteen relationships with the self-evaluation strain dimension are significant.

The coefficient for control with the self-evaluation strain dimension is positive ($\beta = -.199$, $n = 182$, $p = .008$). The effect of control on the self-evaluation strain dimension, however, is slightly weaker than it was in the first model. This seems logical given the addition of the physical workplace characteristics.

The same result implies for work experience which has a slightly weaker effect on the self-evaluation strain dimension, as a result of adding the physical workplace characteristics. More specifically, the coefficient for work experience with the self-evaluation strain dimension remains positive, but decreased to $\beta = .237$, $n = 182$, $p = .010$. On the contrary, conscientiousness and neuroticism have a slightly stronger effect on the self-evaluation strain dimension, as a result of adding the physical workplace characteristics. More specifically, the coefficients for conscientiousness and neuroticism with the self-evaluation strain dimension remains positive, but increased to $\beta = .142$, $n = 182$, $p = .034$ (*conscientiousness*) and $\beta = -.181$, $n = 182$, $p = .007$ (*neuroticism*).

Other than the first model, extraversion no longer shows a significant relationship with the self-evaluation strain dimension ($p = .112$). On the contrary, desk-switching does show a significant positive relationship with the self-evaluation strain dimension ($\beta = .129$, $n = 182$, $p = .077$). This implies that workers who switch desk frequently are more likely to feel efficient. According to Rubinstein et al. (2001), however, task (and desk) switching results in a delay before engaging effectively in a new task. In addition, it is assumed that switching activities during the day increases task variety, which in turn has been associated with the energy component of engagement (e.g. Bakker et al., 2013). The latter relationship, however, has not been found during this study.

In addition, the coefficient for interaction with the self-evaluation strain dimensions is positive ($\beta = .110$, $n = 182$, $p = .102$). Although the significance is slightly higher than the cut-off ($p = .100$), it remains an interesting result. Moreover, the result implies that workers who interact on a social- and work-related level frequently are more likely to feel efficient. This result matches the expectations. According to Maslach & Leiter (2008), for example, interaction is associated with the efficacy component of engagement.

Similar to the first model, work experience seems to be the strongest predictor of the self-evaluation strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret. The model accounts for 30,8% of variance (R^2_{adj}) in the self-evaluation strain dimension. Seemingly, there is some overlap in explained variance, indicating that other variables that affect the interpersonal strain dimension have not been taken into account.

In conclusion, it can be argued that the physical workspace accounts for 1,4% (30,8% - 29,4%) of variance in the self-evaluation strain dimension, when controlled for the control variables. This is shown by the fact that desk-switching only showed a small significant relationship with the self-evaluation strain dimension, interaction just missed the cut-off point, and the remaining physical workplace characteristics did not show any significance at all. Moreover, the results imply that the physical workplace has a small significant contribution to predicting the self-evaluation strain of inefficacy and efficacy. Instead, work characteristics and personal characteristics are more strongly related to the interpersonal strain dimension.

7.3. Physical workplace characteristics

The previous section elaborated on the results of the multiple regression analyses, for which the results were reflected to the findings of the literature review. In this section, bivariate correlations are computed between the physical workplace characteristics and the situational variables. The main reason for performing bivariate analyses after the regression analyses is to find any indirect relationships that might contribute to predicting the burnout – engagement continuum dimensions as well. More specifically, the physical workplace might also affect the burnout – engagement continuum, through the situational variables.

Prior research already elaborated extensively on the relationship between situational variables and the burnout – engagement continuum dimensions ((e.g. Landsbergis, 1988; Richardsen et al., 1992; Maslach et al., 1996; Leiter & Harvie, 1997; Maslach et al., 2001; Leiter & Maslach, 2004;

Leiter, 2005; Leiter et al., 2007; Maslach & Leiter, 2008). Based on the results of this study, it can be concluded that the situational variables, indeed, are correlated to the burnout – engagement continuum dimensions.

The bivariate analyses (Chapter 6) showed some significant correlations between the physical workplace characteristics and the burnout – engagement continuum dimensions, but the effects of many of these physical workplace characteristics were suppressed when controlling for the control variables. Accordingly, bivariate analysis is computed to test the relationships between the physical workplace characteristics and the situational variables. The results of the bivariate analysis are shown in Table 7.10.

Table 7.10: Bivariate analyses – Physical workplace characteristics * Situational variables

Physical workplace characteristics * Situational variables N = 184		Recognition	Overload	Control	Appreciation
Office layout supportiveness	Pearson Correlation	,149*	-,071	-,103	-,037
	Sig. (2-tailed)	,043	,337	,162	,621
Proximity (overhearing)	Pearson Correlation	,027	,007	,097	,078
	Sig. (2-tailed)	,716	,923	,190	,291
Perceived office comfort	Pearson Correlation	,255**	,090	-,127	-,233**
	Sig. (2-tailed)	,000	,226	,086	,001
Accessibility to ICT	Pearson Correlation	,117	,091	-,128	-,118
	Sig. (2-tailed)	,115	,217	,082	,109
Interaction	Pearson Correlation	,093	-,060	-,044	-,112
	Sig. (2-tailed)	,208	,421	,551	,131
Distraction	Pearson Correlation	-,069	,153*	,100	,038
	Sig. (2-tailed)	,353	,038	,175	,605
Desk-switching	Pearson Correlation	,107	,056	-,143	-,060
	Sig. (2-tailed)	,148	,451	,053	,415
Claiming	Pearson Correlation	-,089	-,030	,091	,116
	Sig. (2-tailed)	,232	,690	,218	,117
Possibility to telework	Pearson Correlation	,114	,122	-,205**	-,170*
	Sig. (2-tailed)	,124	,098	,005	,021

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

As can be seen in Table 7.10, the bivariate analysis shows ten significant correlation between the physical workplace characteristics and the situational variables. Notably, ‘distance between workspaces’ and claiming show no significant correlation with the situational variables, nor do they show any significant relationship with the burnout – engagement continuum dimensions. Interaction, on the other hand, shows no significant correlation with the situational variables, but does show a relationship ($p = .102$) with the self-evaluation strain of inefficacy and efficacy (see Section 7.2).

The correlation coefficient for office layout supportiveness ($r = .149$, $n = 184$, $p = .043$) with recognition is positive. The result implies that an increase in office layout supportiveness (e.g. workspace variety, -availability, -openness) is related to increased feelings of recognition. This seems logical, given the fact that increased layout supportiveness provides workers with a variety of work desks, hence increased recognition. Recognition is a factor created from rewards (e.g. financial and social) and fairness. Fairness refers to the extent to which decisions at work are perceived as being fair and equitable, whereas unfairness occurs when there is inequity of workload or reward, when

there is cheating or when evaluations and promotions are handled inappropriately (Maslach et al., 2001). Fairness is generally associated with greater feelings of energy and involvement. This matches the results of this study. Therefore, it might be argued that office layout supportiveness has an indirect relationship with the individual strain of exhaustion and energy and the interpersonal strain of cynicism and involvement.

The correlation coefficient for perceived office comfort ($r = .255, n = 184, p = .000$) with recognition is positive. The result implies that workers who perceive their office environment as comfortable (e.g. ambient factors, ergonomics) are more likely to feel recognised. One might argue that the provision of comfortable workplaces increases recognition. Evidently, building, social and personal factors can influence one's perceived health and comfort (Bluyssen et al., 2010). As such, they may influence employee well-being either positively (engagement) or negatively (burnout). According to Bluyssen et al. (2010), however, the phenomenon *perceived* comfort is far too complex to relate directly to one or multiple components.

The correlation coefficient for distraction ($r = .153, n = 184, p = .038$) with overload is positive. The result implies that workers who are distracted frequently (e.g. noise, interruptions, crowding) are more likely to feel overloaded. This result is perfectly explainable, since noise coming from surrounding occupants having conversations is the biggest source of disturbance in and around regular workspaces (e.g. Olson, 2002), while lack of (auditory) privacy has been associated with greater feelings of exhaustion (e.g. Bakker et al., 2013). This matches the results of this study.

The correlation coefficient for possibility to telework ($r = .122, n = 184, p = .098$) with overload is positive. The result implies that an increase in telework is related to increased feelings of overload. Working from home whilst being permanently connected at the same time may indicate that work never stops because the strict lines for both the beginning and end time diminish. So, although it might be beneficial for individuals, it might also extend the workday, hence increase workload and job stress. This is acknowledged by Peters and Van der Lippe (2007), who found that telecommuters experience more time pressure in the long run, while making longer work hours. This is in line with the results of this study.

The correlation coefficient for perceived office comfort ($r = -.127, n = 184, p = .086$) with control is negative. The result implies that an increase in perceived office comfort (e.g. ambient factors, ergonomics) is related to decreased feelings of control. Evidently, this result seems counter-intuitive. But, other than the counter-intuitive nature of the correlation, no clear conclusions can be drawn from these results. One possible explanation might be that perceived office comfort showed too little variation.

The correlation coefficient for accessibility to ICT ($r = -.128, n = 184, p = .082$) with control is negative. The result implies that workers who are well-supported by ICT-services (e.g. cloud computing, mobile tools, Intranet) are more likely to perceive less control. At any given point, the ICT should be an enabler in the on-going action of work, instead of a hindrance (Lees and Thomas, 1998). Prior research, however, has found that employees' perceived overload is triggered by aspects of their email use, whether or not in addition to the length and number of messages received (Rennecker & Derks, 2012). For example, the pressure to respond quickly (e.g. Derks & Bakker, 2010), unanticipated tasks resulting from received messages (Thomas et al., 2006), and the lack of control over incoming messages (Allen & Shoard, 2005) have all been associated with perceived work overload (see also Demerouti et al., 2014). This indicates that information and communication technology may be a helpful resource for the sender but a demand for the receiver. Although previous bivariate analyses showed a correlation between accessibility to ICT and the self-evaluation strain of inefficacy and efficacy, this might also indicate an indirect relationship between accessibility to ICT and the individual strain of exhaustion and energy.

The correlation coefficient for desk-switching ($r = -.143$, $n = 184$, $p = .053$) with control is negative. The result implies that workers who switch desk frequently are more likely to perceive less control. Whereas desk-switching is often associated with positive (business) outcomes (e.g. efficiency, productivity), Hoendervanger et al. (2016), for example, found that workers may also switch desks for 'negative' reasons (e.g. distraction). The results of the MRA already showed a positive relationship between desk-switching and the self-evaluation strain dimension, implying that workers who switch desk frequently are more likely to feel efficient. According to Rubinstein et al. (2001), however, task (and desk) switching results in a delay before engaging effectively in a new task. Besides, interruptions and task-switching might trigger overload (e.g. Demerouti et al., 2014). Desk-switching is one of the foundations of the activity based concept, indicating that workers cannot control entirely where they want to work. In general, (a lack of) control is related to the self-evaluation strain dimension (Maslach et al., 2001), which is in line with the results of this study.

The correlation coefficient for possibility to telework ($r = -.205$, $n = 184$, $p = .005$) with control is negative. The result implies that workers who telework frequently are more likely to perceive less control. Although this seems counter-intuitive, telework has a positive relationship with work-home interference. This seems logical since workers may perceive less control over their work-life balance. Zedeck and Mosier (1990), for example, pointed out that teleworking might restrict career development for vulnerable groups (e.g. elderly individuals, pregnant couples), since they are isolated from the organisation, thereby potentially diminishing their promotion possibilities (Demerouti, 2006). In addition, it is argued that telework reduces the sense of community among co-workers and other staff members, resulting in a lack of (active) feedback, authority, support from either supervisors and co-workers, and organisational decision-making. Although no significant relationship was found between the possibility to telework and the burnout – engagement continuum dimensions, this might be an indication for an indirect relationship.

The correlation coefficient for perceived office comfort ($r = -.233$, $n = 184$, $p = .001$) with appreciation is negative. The result implies that an increase in perceived office comfort (e.g. ambient factors, ergonomics) is related to decreased feelings of appreciation. According to Bitner (1992), one of the major challenges in designing office environments is that optimal design for one person or group may not be the optimal design for other. Accordingly, making constant adjustments to building conditions or ergonomics might not be appreciated among co-workers. Although no significant relationship was found between perceived office comfort and the burnout – engagement continuum dimensions, this might be an indication for an indirect relationship.

The correlation coefficient for possibility to telework ($r = -.170$, $n = 184$, $p = .021$) with appreciation is negative. The result implies that workers who telework frequently are more likely to feel less appreciated. Telework facilitates employees to be separated in time and place, thereby reducing the possibility to gain social support and participate in social activities (e.g. Sonnentag et al., 2012; Demerouti et al., 2014). In turn, a lack of presence at work may result in perceived inequities towards (intrinsic) rewards and promotions. In general, supervisor support has been associated with less exhaustion, while co-worker support is more closely related to efficacy (Maslach & Leiter, 2008). Although no significant relationship was found between the possibility to telework and the burnout – engagement continuum dimensions, this might be an indication for an indirect relationship.

7.4. Conclusions

This chapter concluded the process of answering sub question 3: What is the relationship between the physical environment and the burnout – engagement continuum. In particular, this chapter focused on the data analyses, for which six multiple regression analyses were computed between the dependent variables and independent variables that showed a significant relationship in Chapter 6.

Both physical workplace characteristics and control variables were entered in the MRAs to determine the unique contribution of variables in predicting the outcome variables (burnout – engagement continuum dimensions). Interestingly, the results imply that many variables did not have a significant relationship with the burnout – engagement continuum, even if they were significantly correlated in the bivariate analyses. Besides, variables that remained significant in the second model often showed a slightly weaker effect than they had in the first model, which seems logical given the addition of the physical workplace characteristics in the second model.

The MRAs for the individual strain dimension showed four significant relationships when all variables were entered into the MRA simultaneously (Figure 7.9), being distraction (*office use*), neuroticism (*personality*), recognition and overload (*situational variables*). Only 2,8% of variance is explained by physical workplace characteristics. Moreover, the results imply that the physical workplace has a small significant contribution to predicting the individual strain of exhaustion and energy. For this MRA, overload seems to be the strongest predictor of the individual strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret.

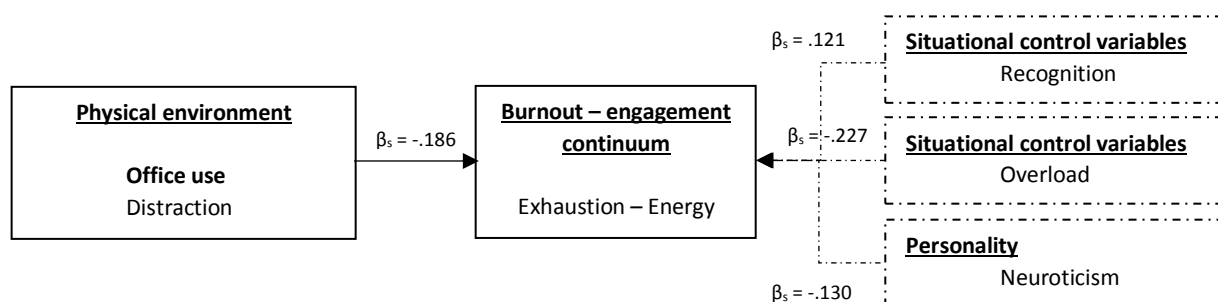


Figure 7.9: Multiple regression analyses results – individual strain dimension (standardized coefficients)

The MRA for the interpersonal strain dimension showed four significant relationships when all variables were entered into the MRA simultaneously (Figure 7.10), being formal interaction (*activities*), recognition (*situational variables*), extraversion and openness (*personality*). Only 0,6% of variance is explained by physical workplace characteristics. Moreover, the results imply that the physical workplace has no significant contribution to predicting the interpersonal strain of cynicism and involvement. For this MRA, formal interaction seems to be the strongest predictor of the interpersonal strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret.

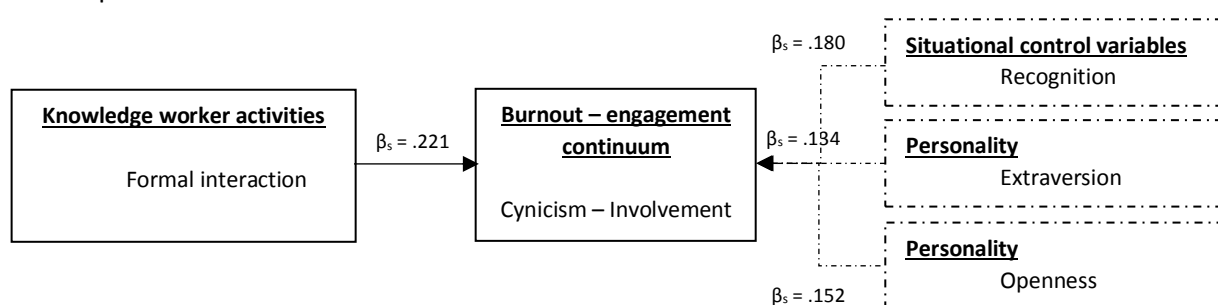


Figure 7.10: Multiple regression analyses results – interpersonal strain dimension (standardized coefficients)

The MRA for the self-evaluation strain dimension showed five significant relationships when all variables were entered into the MRA simultaneously (Figure 7.11), being control (*situational variables*), work experience (*work-related*), conscientiousness and neuroticism (*personality*), interaction and desk-switching (*office use*). Only 1,4% of variance is explained by physical workplace characteristics. Moreover, the results imply that the physical workplace has a small significant contribution to predicting the self-evaluation strain of inefficacy and efficacy. For this MRA, work experience seems to be the strongest predictor of the self-evaluation strain dimension. The model is significant at $p = .01$, indicating that the model is reliable to interpret.

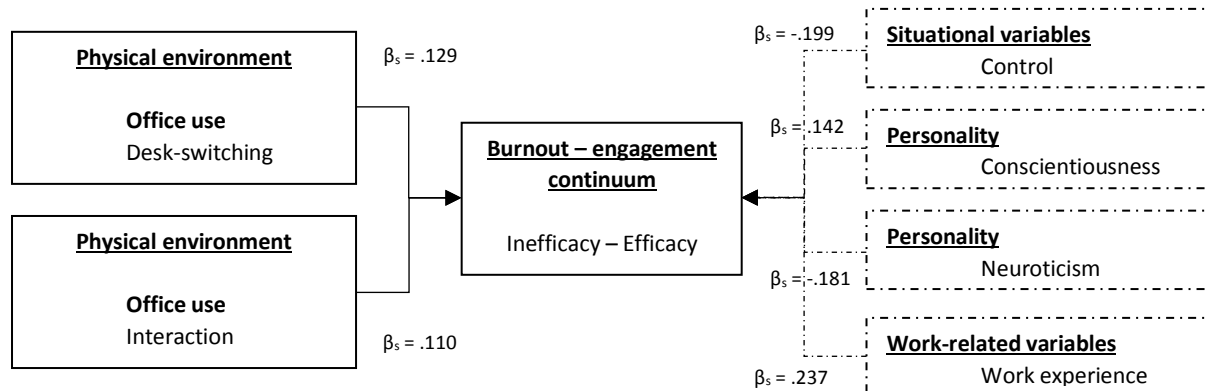


Figure 7.11: Multiple regression analyses results – self-evaluation strain dimension (standardized coefficients)

In general, the results imply that the physical workplace has a small significant contribution to predicting the burnout – engagement continuum dimensions. However, work characteristics and personal characteristics are more strongly related to the burnout – engagement continuum dimensions, indicating that work- and personal characteristics are better predictors for potential burnout or engagement than physical workplace characteristics. This seems logical since corporate real estate management, in general, is a supportive resource. Many of the reported relationships are clear and can be explained by existing literature. One exception is the relationship between control (e.g. personal control, authority, participation) and the self-evaluation strain of inefficacy and efficacy, for which the result showed a counter-intuitive sign. Further research towards this relationship could clarify the results.

Bivariate analyses between the physical workplace characteristics and the situational variables showed some interesting results as well. For example, it was found that office layout supportiveness may have an indirect relationship with the individual strain of exhaustion and energy and the interpersonal strain of cynicism and involvement. In addition, it was found that the possibility to telework correlated positively with overload, indicating a potential indirect relationship between the possibility to telework and the individual strain of exhaustion and energy. On the contrary, possibility to telework correlated negatively to appreciation, indicating a potential indirect relationship between the possibility to telework and the self-evaluation strain of inefficacy and efficacy. Similar, a potential indirect relationship was found between perceived office comfort, and accessibility to ICT, respectively, and the individual strain of exhaustion and energy.

8. Conclusions and recommendations

To date, over a million Dutchmen are experiencing burnout symptoms at a younger age than ever before, making job burnout the single most important occupational disease in modern work-life. It is important for organisations to recognise employees for being the most valuable assets of the organisation. The physical work environment can affect employee well-being both positively (engagement) and negatively (burnout), causing more and more organisations to redefine the design and structure of the workplace. Organisations have already attempted to create a synergetic balance between the employees' needs for well-being and the company's goal for profitability. Moreover, organisations searched for an office concept that would optimise the use of the available space (efficiency) and the increasing focus on communication and work-life balance. One of such concepts is activity based working, implying supportive work environments that combine hot-desking with a variety of workplaces, designed to support different types of activities (e.g. Hoendervanger et al., 2015). However, little is known about the relationship between distinct physical workplace characteristics in activity based offices and the burnout – engagement continuum dimensions.

This research provides insights into the physical work environment and the different physical workplace characteristics that can be distinguished for activity based offices. It also identifies different characteristics that can be linked to the burnout – engagement continuum dimensions. Lastly, this research provides new insights into the unique contribution of the physical workplace characteristics in predicting the burnout – engagement continuum dimensions. Gaining clear insights in the workplace characteristics that affect employee well-being both positively (engagement) and negatively (burnout) provides (corporate real estate) managers a guideline to make well-founded accommodation decisions when incorporating activity based office concepts. The main research question that follows from this objective is as follows:

What characteristics of the physical work environment in activity based offices are related to the position of workers on the burnout – engagement continuum and how big is their influence?

This research contains desk research (literature review) and an explorative part containing quantitative research (data collection). The data required for the quantitative research is collected by means of an online questionnaire that is distributed among knowledge workers in the Netherlands. The questionnaire was distributed online between July 10th and September 4th. The final sample contains 184 respondents. Both the reliability and validity (internal and external) are good. Compared to the Dutch nation-wide average, the sample includes a relatively high percentage of females and few single households.

The literature review showed that people's relationship with their jobs is a continuum between the negative experience of burnout and the positive experience of engagement, hence the burnout – engagement continuum. Consensus was found regarding three interrelated dimensions, being exhaustion (B) – energy (E), cynicism (B) – involvement (E) and inefficacy (B) – efficacy (E). In addition, many organisational risk factors (i.e. situational variables) have been identified which can be summarised in the six key domains of the workplace environment (e.g. workload, control, reward, community, fairness, and values). Five consistent constructs encompassing the physical work environment were identified, being office layout supportiveness, perceived office comfort, accessibility to ICT, office use, and possibility to telework (i.e. office location). Although the domains are closely interrelated, each domain encompasses a distinct perspective to the interaction between people and their physical environment. Besides, three important knowledge worker activities were identified, being concentrated work, formal interaction, and informal interaction. Lastly, multiple

control variables were identified for having an influence on the burnout – engagement continuum, among which are personality traits (5), work-related variables (8), and personal characteristics (4). The physical workplace characteristics that relate to the burnout – engagement continuum, or the organisational risk factors, were examined by means of the online questionnaire.

The variables that were identified from existing literature represented the starting point for examining the unique contribution of the physical workplace characteristics in predicting the burnout – engagement continuum dimensions. To reduce the number of variables included in the multiple regression analyses, data reduction was used. Factor analysis showed that the (ten) variables associated with the *office use* component, were internally consistent when they were combined into four new factors, being interaction, distraction, desk-switching and claiming. The same mechanism applied for the situational variables, for which four new factors were found, being recognition, overload, control, and appreciation. Results of the questionnaire showed that knowledge workers perceive the following aspects as predictors of burnout or engagement (Figure 8.1).

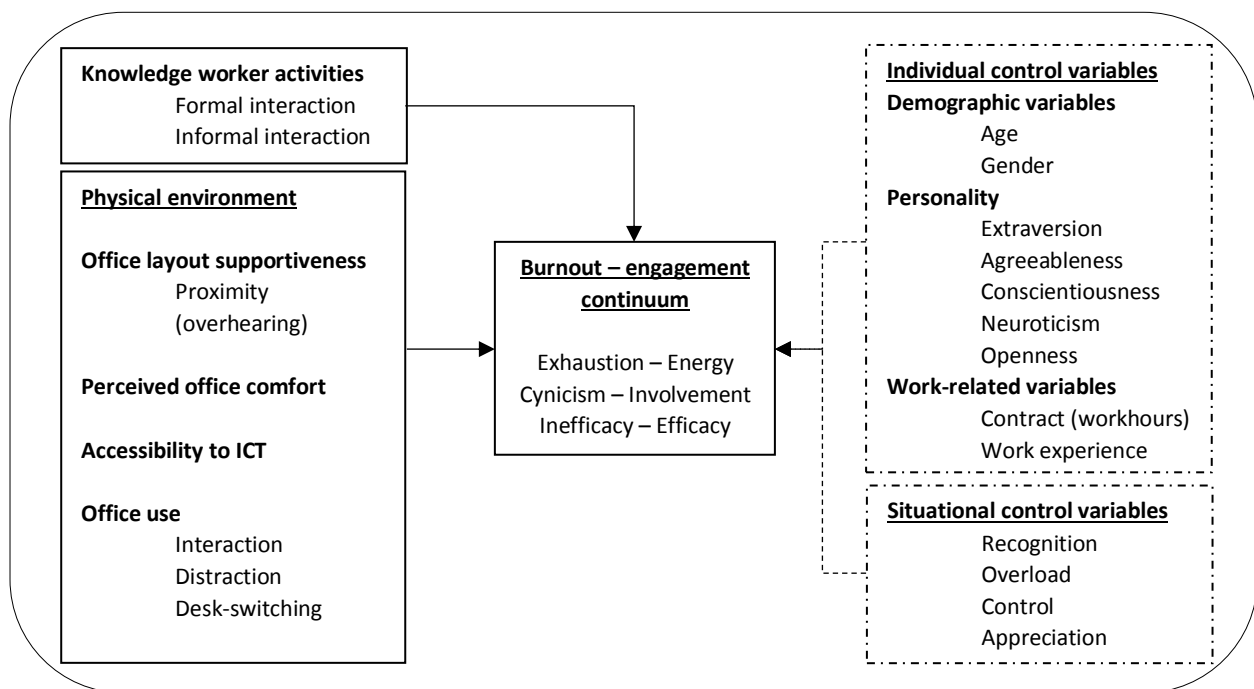


Figure 8.1: Input variables multiple regression analyses

For this study, multiple regression analysis (MRA) was used to determine the effect of independent variables on the burnout – engagement continuum dimensions. Two steps in each MRA were computed for each dependent variable. Accordingly, six MRAs were performed to investigate the effect of the physical workplace characteristics on the individual-, interpersonal-, and self-evaluation strain dimension, respectively.

The results of the first set of MRA's showed four significant relationships between the variables included and the individual strain of exhaustion and energy. More specifically, recognition, overload, neuroticism, and distraction all showed significant relationships with the individual strain dimension. Results showed that recognition is positively related to energy, hence workers who receive appropriate recognition feel more energetic. The balance between the input (e.g. time, effort, expertise) and output (e.g. rewards, recognition) should be maintained at any given point. A misfit can affect workers' feelings, causing workers to become exhausted, and eventually cynical if the problem remains unsolved. Results also showed a negative relationship between overload and energy, hence excessive workload decreases feelings of energy. Overload is consistently associated with job stress

and both strongly contribute to exhaustion. It was also found that neurotic workers feel less energetic. Clearly, being nervous easily drains out energy. Results also showed that distraction is negatively related to energy. Constantly being interrupted and working in crowded or noisy areas strongly reduces feelings of energy. In fact, noise was reported to be the biggest source of disturbance in and around workspaces. It should be kept in mind, however, that one person's distraction is another person's interaction.

The results of the second set of MRA's showed four significant relationships between the variables included and the interpersonal strain of cynicism and involvement. More specifically, formal interaction, recognition, extraversion, and openness all showed significant relationships with the interpersonal strain dimension. Results showed that formal interaction is positively related to involvement. Formal interaction (e.g. planned meetings, collaboration, participation in organisation decision-making) is an excellent way of communicating insights with co-workers as it provides an opportunity to share knowledge or concerns. Once such expressions are appreciated, or even implemented, it contributes to feelings of involvement. The results also showed a positive relationship between recognition and involvement, hence workers who receive appropriate recognition also feel involved in the organisation. Appropriate recognition increases the perceived value of both the work and the workers. Extraversion is positively related to involvement as well. Extraverts show positive emotions, frequent personal interactions and a high need for stimulation, which may be particularly helpful for mobilising support and asking for feedback. Results also showed a positive relationship between openness and involvement, hence workers who have an open mind for new experiences feel more involved. The results indicate that organisations should stimulate personal expression and minimise the barriers for speaking out.

The results of the third set of MRA's showed five significant relationships between the variables included and the self-evaluation strain of inefficacy and efficacy. More specifically, control, conscientiousness, neuroticism, work experience, and desk-switching all showed significant relationships with the self-evaluation strain dimension. In addition, a strong relationship was found between interaction and efficacy, although this relationship just missed the cut-off. Results showed that (personal) control is negatively related to efficacy. Although this is very counter-intuitive, a possible explanation might be that an increase in control results in role ambiguity (the absence of direction in work), which is associated with the inefficacy component of burnout. Another possible explanation might be that great control stimulates proactive behaviour such as job crafting, which, in turn, might result in extra workload. Further research, however, should clarify this relationship. The results also showed a positive relationship between conscientiousness and efficacy, hence conscious workers, or workers who tend to do a thorough job, feel more efficient. In addition, it was found that neurotic workers feel less efficient. The results showed a positive relationship between work experience and efficacy, hence more experienced workers feel more efficient. This is perfectly explainable. Prior research found that age is confounded with work experience, indicating that burnout appears to be more of a risk earlier in one's career. Besides, after several years of work experience, work becomes some sort of a routine. Workers often feel very efficient with routine work. Interesting results were reported for the relationship between desk-switching and efficacy. The results indicated that workers who switch desk frequently feel more efficient. Although the result itself is not surprisingly, the majority of respondents indicate to never actually switch workplaces. Prior research found that task (and desk) switching results in a delay before engaging effectively in a new task, which might be a possible explanation. Finally, the results showed a positive relationship between interaction and efficacy, hence workers who interact on a social- and work-related level frequently feel more efficient. Interaction is vital for an organisation as it enables workers to express creativity, share knowledge, or ask questions.

The results not only show the direction, but also the strength of the relationships. Therefore, it was interesting to explore which variables predict the burnout – engagement continuum dimensions best. The first MRA showed that this study sample reported overload to be the strongest negative predictor of energy, followed by distraction (office use) and neuroticism. Recognition was found to be the strongest positive predictor of energy. The second MRA showed that this study sample reported formal interaction to be the strongest positive predictor of involvement, followed by recognition and openness. Appreciation was found to be the strongest negative predictor of involvement, followed by distraction (office use) and neuroticism. However, none of these predictors were significant. The third MRA showed that this study sample reported work experience to be the strongest positive predictor of professional efficacy, followed by conscientiousness, desk-switching (office use) and interaction (office use). Control was found to be the strongest negative predictor of efficacy, followed by neuroticism. The large majority of relationships is clear and can be, or has been, confirmed by existing literature. Other relationships are counter-intuitive and need to be verified by additional empirical research. This especially applies for the (negative) relationship between control and professional efficacy, and the negative relationship between appreciation and cynicism. All models, however, are significant at the $p = .01$ level, indicating that the models are reliable to interpret.

Notably, the three MRAs showed only few significant relationships between the physical workplace characteristics and the burnout – engagement continuum dimensions, whereas the bivariate analyses showed a moderate amount of significant correlations, especially with the self-evaluation strain of inefficacy and efficacy. One explanation is the inclusion of many control variables that showed significant relationships with the burnout – engagement continuum dimensions as well. Therefore, it was interesting to explore whether the physical workplace characteristics show any indirect relationships with the burnout – engagement continuum dimensions, through the situational variables which often correlated significantly to the burnout – engagement continuum dimensions. These bivariate analyses (BA) showed some interesting results. For example, it was found that office layout supportiveness has an indirect relationship with the individual strain of exhaustion and energy, through recognition. In addition, it was found that the possibility to telework correlated positively with overload, indicating an indirect relationship between the possibility to telework and the individual strain of exhaustion and energy. On the contrary, possibility to telework correlated negatively to appreciation, indicating an indirect relationship between the possibility to telework and the self-evaluation strain of inefficacy and efficacy. Similarly, an indirect relationship was found between perceived office comfort, and accessibility to ICT, respectively, and the individual strain of exhaustion and energy. However, the fact that such relationships were found by means of bivariate analyses, instead of multiple regression analyses, emphasises the need for further research to test relationships.

In conclusions, this research explored the relationships between distinct physical workplace characteristics in activity based offices and the burnout – engagement continuum. Based on the literature review, the analyses and the interpretation of the results, it can be stated that the physical workplace has a small significant contribution to predicting the burnout – engagement continuum dimensions. More specifically, the physical workspace accounts for 2,8% of variance in the individual strain dimension, 0,6% of variance in the interpersonal strain dimension, and 1,4% of variance in the self-evaluation strain dimension. In addition, it was found that work characteristics and personal characteristics are strongly related to the burnout – engagement continuum dimensions. This is validated by the fact the non-physical workplace characteristics are among the strongest predictors of the burnout – engagement continuum dimensions. However, it should be noted that the results are conform expectations since corporate real estate management is a supportive resource. A final overview of the research outcomes can be found in Figure 8.2.

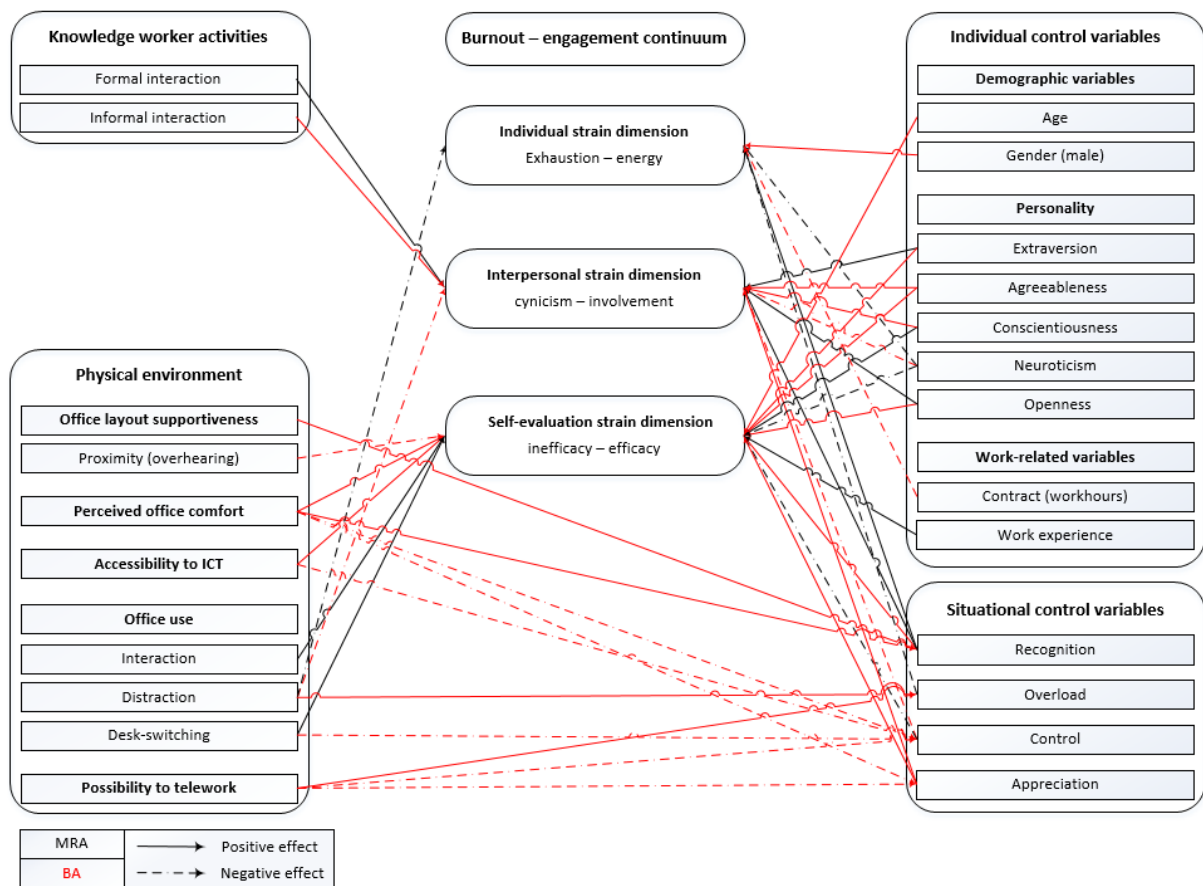


Figure 8.2: Research outcomes: overview of variables that have a significant relationship with the BEC dimensions

8.1. Contribution to knowledge

Studies aiming at the optimisation of the person-environment fit between employees and work environments are not new in research literature. But, the influence of distinct characteristics of activity based office environments on the burnout – engagement continuum dimensions has never been investigated before. Existing literature tends to focus either on the independent variables such as the physical environment and the behavioural environment, or on the dependent variables such as business outcomes, productivity and employee health. This research attempts to find out which, and to what extent, characteristics of the physical environment affect the position of workers on the burnout – engagement continuum. This study is a first attempt to cover this gap in the literature.

This research contributes knowledge to the field of corporate real estate management. By identifying distinct characteristics of the physical work environment in activity based office, a clear overview of physical workplace characteristics was generated that relate, somehow, to burnout or engagement. With the outcomes being a potential tool to increase productivity, this research provides additional insights for corporate real estate managers to make well-founded accommodation decisions when incorporating activity based office concepts.

This research also contributes knowledge to the research field of environmental psychology, by providing more insight into the workspace needs of knowledge workers. Within the field of psychology, a long history exists of trying to explain employee behaviour in terms of the interaction between the person and the environment. This research showed consistent (direct and indirect) relationships between interaction and engagement and between distraction and burnout. By identifying the characteristics of the work environment that increase engagement and limit burnout

symptoms, organisations increase their knowledge on how to deal with burned-out employees, or even better, prevent them from burning out in the first place. In addition, organisations may increase their knowledge on how to stimulate and retain engagement among employees. The effects between physical workplace characteristics and the burnout – engagement continuum dimensions were controlled for many personal characteristics, such as personality, socio-demographics and work-related attitudes (e.g. expectations towards the job). Accordingly, the results allow researchers to investigate differences between groups. The strength of predictors, for example, may differ per group based on age, gender, or work experience.

This research builds upon prior literature towards both research fields. The results of this study are reflected to prior literature by discussing the research outcomes in Chapter 6 and Chapter 7. Accordingly, some of the results confirm prior findings, such as positive relationship between overload and exhaustion, or the negative relationship between neuroticism and efficacy. Some of the results might be explained by available literature such as the relationship between gender and the individual strain of exhaustion and energy, or the relationship between age and the self-evaluations strain of inefficacy and efficacy. Some of the expected results, however, were not found such as the proposed relationship between (desk) claiming and the burnout – engagement continuum dimensions, or the proposed relationship between expectations and the burnout – engagement continuum. Accordingly, it would be interesting to test these relationships under different conditions.

One of the most interesting results of this research is the finding that that the physical workplace (only) has a small significant contribution to predicting the burnout – engagement continuum dimensions. Instead, work characteristics and personal characteristics are more strongly related to the burnout – engagement continuum dimensions. Given the limited literature on burnout and engagement in relation to aspects of the physical environment, this is especially interesting. Prior studies failed to provide an integral approach regarding the burnout – engagement continuum. This research contributes to the understanding of these topics and their relationships.

8.2. Limitations and recommendations for further research

This research mainly focused on the effects between the physical workplace characteristics and the burnout – engagement continuum. By discussing the results in Chapter 6 and Chapter 7, it was already pointed out that many other variables are related to the burnout – engagement continuum as well. This research, therefore, already started exploring some potential indirect relationships, thereby proposing that the physical workplace characteristics may affect the burnout – engagement continuum dimensions indirectly, through the situational variables. It would be especially interesting to continue this field of research. Therefore, it is highly recommended to investigate the in-depth relationships between the physical workplace characteristics and the situational variables (or organisational risk factors), and variables that have not yet been included. When researching these relationships, it is advised to include all 29 statements derived from the AWS, rather than the selection (11 statements) used in this research.

Literature (Chapter 2 and 3) showed that it was difficult to establish the potential relationships between the *office use* attributes (e.g. interaction, distraction, desk-switching, desk-sharing) and the burnout – engagement continuum dimensions. It was argued that these attributes are more likely to depend on the workers' individual preferences and needs for well-being. This study showed that the distraction and interaction attributes were among the strongest predictors of the burnout – engagement continuum dimensions. Since prior research towards these relationships is limited, these results itself emphasise the need for further research.

Data preparation (Chapter 5) showed that ten variables associated with the *office use* component were combined and reduced into four new factors, being interaction, distraction, desk-

switching and claiming. It would be interesting to see further research continuing to investigate these factors. By continuing to validate the results of this study, the scales of the (office use) factors may be validated so that they can be used in future research. To a lesser extent, this also applies to the four factors derived for the situational variables, being recognition, overload, control, and appreciation. It is expected that the combination of eleven statements (rather than 29) used to address the situational variables is new and that the scales have not been validated by means of prior studies yet.

The results of this research showed that the physical workplace accounts for some variance (albeit little) in predicting the burnout – engagement continuum dimensions. However, it may be possible that some physical workplace characteristics are missing. Therefore, it would be interesting to further investigate the physical workplace characteristics that affect the burnout – engagement continuum dimensions. It is recommended to use a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), or ranging from 1 (never) to 5 (always), so that the results can be compared to the results of this study. This research provides an extensive overview of aspects associated with the physical workplace, which might be an interesting guideline for further research.

Prior research (e.g. Grawitch et al., 2006; Haynes, 2007a; 2007b; Rothe et al., 2012) has linked many of the physical workplace characteristics that were used during this research to (perceived) productivity. Also, burnout has consistently been linked to (decreased) productivity. Accordingly, it would be very interesting to continue this study and its outcomes by examining how the distinct significant (physical workplace) characteristics relate to productivity. By doing so, the outcomes may present researchers with an integral overview for corporate real estate managers. It would be very interesting to see engagement being used as performance indicator.

Compared to the Dutch nation-wide average, the sample includes a relatively high percentage of females and few single households. For generalisability reasons, it would be interesting to conduct the same research with a larger sample and/or in other contexts.

This study also has some limitations. Commonly, complex aspects such as burnout require longitudinal research in which researchers can document certain developments over time and make series of observations. However, this research, being a Master thesis, has a time limitation of approximately six months. As a result, longitudinal research was not possible and, therefore, this research can be classified as a cross-sectional study.

This study was limited to observing the *perceived* effects of respondents only. For example, respondents were asked whether they *perceived* the office environment comfortable, for which they could rate a selection of ambient factors individually. Ideally, the effect of ambient factors is measured by professional equipment.

Research on the burnout – engagement continuum uses the MBI-GS (i.e. general survey) to assess the three interrelated dimensions. However, the use of this specific version was restricted by copyrights. As a result, this research used the *UBOS or Utrechtse Burnout Schaal*. For the purpose of this research, the UBOS-A (English: UBOS-GS), rather than the original UBOS, was used since this measurement is very similar to the MBI-GS.

Data required for the exploratory research was collected by means of an online questionnaire. Therefore, it was not possible to supervise the process of filling in the questionnaire (e.g. vocal explanation). In addition, people may not be willing to spend much time on questionnaires, which was also reflected by the response rate. The bilingual links were used 479 times, of which 222 respondents filled in the questionnaire. After the data preparation, a total of 184 completed questionnaires remained for continuing this study.

Burnout is not an easy topic to question since it remains associated with negative perceptions. Accordingly, the privacy-sensitive character of asking respondents questions about their potential to burnout, should be recognised at any given time. Throughout the questionnaire, questions and statement mainly focused on engagement, while personal questions (e.g. name of organisation) were

reduced to a minimum. However, the results might indicate some degree of the Hawthorne-effect, referring to the awareness of being interviewed. Observations changes behaviour, which could have possibly changed the answers positively. Albeit personal, it is recommended to include the name of the respondents' employer or organisation when re-conducting this study. By doing so, the practical implications are greatly enhanced.

8.3. Practical implications

The results of this study can be translated into practical implications and recommendations for corporate real estate managers, facility- and human resource managers, developers, and owners of office buildings that use activity based working. Implementing these recommendations can affect the concerned organisations.

Organisations are increasingly forced to focus on employee needs in order to be able to, not only, support their satisfaction, health and productivity but also develop a competitive advantage by attracting and retaining talented employees. Knowing that the physical work environment can affect employee well-being both positively (engagement) and negatively (burnout), emphasises the importance of aligning the physical work environment to the employee needs. This study provides corporate real estate managers, facility managers, developers and owners of office buildings with insights regarding the (physical) workplace needs of knowledge workers that generally occupy activity based offices. In addition, this study provides human resource managers a guideline towards the (behavioural) workplace needs that affect burnout and engagement. Based on the results of this study, organisations can make well-founded accommodation decisions when incorporating activity office concepts.

Since engagement is the desired goal for any burnout intervention, it would be helpful for (corporate real estate) managers to focus on increasing engagement, thereby limiting burnout symptoms, so that preventive intervention measures could be more effectively implemented. The basic principle is that if individuals are experiencing some of these early signs of burnout, this information should be a trigger for organisations to consider actions to prevent burnout and build engagement.

Despite the fact the personal- and work-related aspects are more strongly related to the burnout – engagement continuum dimensions than physical workplace characteristics, an overview can be generated showing the physical workplace characteristics that are perceived important by knowledge workers for supporting their position on the burnout – engagement continuum (Table 8.1). The physical workplace characteristics are ranked based on the strength (β 's) of their relationships with the burnout – engagement continuum dimensions.

When (re)defining the design and structure of the physical workplace, it is recommended to aim at an optimal alignment between organisational objectives for profitability and productivity and the worker goals for well-being. This is especially important since the 'one size fits all' activity based office does not exist. Instead, strategic management, operational management and (general) workers should combine their knowledge to achieve optimal alignment. Organisations, and their workplaces, have different needs depending on the activities performed and the workers involved, hence it is recommended to undertake a thorough needs assessment before (re)defining the design and structure of the physical workplace. It is important for corporate real estate managers, facility- and human resource managers, developers and owners of office buildings to understand that all physical workplace characteristics need to be taken into account when creating activity based office concepts that aim at supporting the employee needs.

Table 8.1: Physical workplace characteristics

Rank	Physical workplace characteristics	Strength (β s)	Related strongest to (...)
1	Formal interaction (activity)	.221	involvement
2	Distraction (general)	.186	exhaustion
3	Desk-switching	.129	efficacy
4	Interaction (general)	.110	efficacy
5	Informal interaction (activity)	.068	involvement
6	Proximity workplaces	.033	inefficacy
7	Accessibility to ICT	.032	efficacy
8	Perceived office comfort	.019	inefficacy / efficacy

This study showed that there are eight unique physical workplace aspects that have the potential to stimulate engagement among knowledge workers in activity based offices (Table 8.1). The most important stimulators are associated with the *office use* component of the physical work environment. A strong positive for the activity based office concept is the opportunity for communication, collaboration and (formal and informal) interaction. However, it was also found that workers are easily distracted due to interruptions or excessive noise. When striving towards engagement, corporate real estate managers should aim at maximising the interaction component whilst at same time minimising the distraction component. Interaction could be stimulated by means of creating a pleasant workplace culture (e.g. no desk-claiming, common break room, communication rooms). It is also important for (corporate real estate) managers to understand that workers should be better supervised when switching to unfamiliar office environments. Although it is unlikely to create workspaces that are completely distraction-free, it is recommended for corporate real estate managers to focus on creating spacious workplaces (e.g. allocation of workplaces). If needed, workers should be given the opportunity to isolate themselves from colleagues by providing various types of workplaces (e.g. cell-offices, shared-room offices, quiet areas, private areas). Activity based office concepts have the opportunity to provide both with thoughtful office design.

This research suggests that in order to stimulate engagement and limit burnout symptoms among workers, it is important to support the physical workplace needs of these workers. It is recommended to at least implement these physical workplace characteristics that are consistently associated with engagement, being constant accessibility to qualitative ICT (services), spacious workplace allocation, desk-switching, (perceived) office comfort, and interaction (formal and informal). However, this does not imply that organisations should ignore other physical workplace characteristics.

During the process of distribution, contact was generally established with corporate real estate managers, executives, facility- and human resource managers. Many emphasised the social needs of the workers, by arguing that a sense of community was very important for maintaining a pleasant atmosphere. Although working at home can be more productive at busy days, many employees intentionally come to the office to maintain their social relationship with colleagues and the organisation. Therefore, it is recommended for organisations to facilitate workers to come to the office at least one day a week (mandatory). This way, organisations can ensure and stimulate a sense of community among employees, in which they share praise, comfort, and happiness.

It has been stated that the personal- and work-related variables are more strongly related to the burnout – engagement continuum dimensions than the physical workplace characteristics. Therefore, it is recommended for corporate real estate managers, facility managers or property managers to consult with the human resource department for which they should focus on creating a pleasant workplace culture in which workers are stimulated to feel energetic, involved, and efficient. The basic premise, here, is that engagement should be used as a performance indicator.

Bibliography

Aaltonen, L., Ala-Kotila, P., Järnström, H., Laarni, J., Määtä, H., Nykänen, E., ... Nagy, G. (2012). State-of-the-Art Report on Knowledge Work: New Ways of Working. Espoo 2012. VTT Technology 17. 106 p. + app. 9 p.

Ahola, K. (2007). Occupational Burnout and Health. Helsinki, Finl.: Finn. Inst. Occup. Health.

Alarcon, G., Eschleman, K. J., & Bowling, N. A. (2009). Relationships between personality variables and burnout: a meta-analysis. *Work Stress* 23:244–63.

Albrecht, S. L., ed. (2010). Handbook of Employee Engagement: Perspectives, Issues, Research and Practice. Glos, UK: Elgar.

Allen, D. K., & Shoard, M. (2005). Spreading the load: mobile information and communication technologies and their effect on information overload. *Information Research* 10, paper 227. Available at: <http://InformationR.net/ir/10-2/paper227.html>.

Allen, D. K., Renn, R., & Griffeth, R. (2003). The impact of telecommuting design on social systems, self-regulation, and role boundaries. In J. Martocchio & G. Ferris (Eds.), *Research in personnel and human resources management* (Vol. 22, pp. 125–163). Oxford, UK: Elsevier.

Allen, T. J. (1977). Managing the flow of technology. Cambridge, MA: MIT Press.

Allen, T. J., & Henn, G. W. (2007). The organization and architecture of innovation: Managing the flow of technology. Burlington, MA: Butterworth-Heinemann.

Appel-Meulenbroek, R., Vries, B., de & Weggeman, M. (2016). Knowledge behaviour: The role of spatial design in buildings. *Environment and Behaviour*, 1-30. DOI: 10.1177/0013916516673405

Appel-Meulenbroek, R., Groenen, P., & Janssen, I. (2011). An end-user's perspective on activity-based office concepts. *Journal of Corporate Real Estate*, 13(2), 122-135.

Appel-Meulenbroek, R., Kemperman, A., Kleijn, M., & Hendriks, E., (2015). To use or not to use: which type of property should you choose? Predicting the use of activity based offices. *Journal of Property Investment & Finance*, Vol. 33 Iss 4 pp. 320 – 336.

Appel-Meulenbroek, R., Kemperman, A., van Susante, P., & Hoendervanger, J. (2015). Differences in employee satisfaction and productivity in new versus traditional work environments. *European Facility Management Conference*. Glasgow: EuroFM (forecoming).

Baarda, B. (2009). *Dit is onderzoek*. Houten: Noordhoff Uitgevers.

Baarda, B., Bakker, E., van der Hulst, M., Fischer, T., Julsing, M., van Vianen, R., & Goede, M. P. M. (2014). *Basisboek methoden en technieken: kwantitatief praktijkgericht onderzoek op wetenschappelijke basis*. Houten: Noordhoff Uitgevers.

Baarne, R., Houtkamp, P., & Knotter, M. (2010). *Het nieuwe werken ontrafeld* [Unraveling new ways of working]. Assen, The Netherlands: Koninklijke Van Gorcum/Stichting Management Studies.

Bakker, A. B. (2009). Building engagement in the workplace. In *The Peak Performing Organization*, ed. RJ Burke, CL Cooper, pp. 50–72. Abingdon, UK: Routledge.

Bakker, A. B. (2011). An evidence-based model of work engagement. *Curr. Dir. Psychol. Sci.* 20:265–69.

Bakker, A. B., Albrecht, S. L., & Leiter, M. P. (2011). 'Work engagement: Further reflections on the state of play', *European Journal of Work and Organizational Psychology*, 20: 1, 74 — 88.

Bakker, A. B., & Demerouti, E. (2007). The job demands–resources model: state of the art. *J. Manag. Psychol.* 22:309–28.

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Dev. Int.* 13:209–23.

Bakker, A. B., & Demerouti, E. (2014). Job demands–resources theory. In *Wellbeing: A Complete Reference Guide*, ed. C. Cooper, P. Chen, pp. 37–64. Chichester, UK: Wiley-Blackwell.

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005a). Job resources buffer the impact of job demands on burnout. *J. Occup. Health Psychol.* 10:170–80.

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2013). Burnout and work engagement: The JD-R approach. *Annu. Rev. Organ. Psychol. Organ. Behav.* 2014. 1:389–411.

Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement particularly when job demands are high. *J. Educ. Psychol.* 99:274–84.

Bakker, A. B., & Leiter, P. L. (2010). Work engagement: a handbook of essential theory and research. Chapter 13. Where to go from here: Integration and future research on work engagement, pp. 181–196.

Bakker, A. B., Schaufeli, W. B., & Demerouti, E. (2000). Using equity theory to examine the difference between burnout and depression. *Anxiety, Stress, and Coping, Vol. 13*, pp 247–268.

Bakker, A. B., Schaufeli, W. B., Demerouti, E., Janssen, P. M. P., Van der Hulst, R., & Brouwer, J. (2000). Using equity theory to examine the difference between burnout and depression. *Anxiety Stress Coping* 13:247–68.

Bakker, A. B., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008a). Work engagement: an emerging concept in occupational health psychology. *Work Stress* 22:187–200.

Bakker, A. B., Tims, M., & Derks, D. (2012b). Proactive personality and job performance: the role of job crafting and work engagement. *Hum. Relat.* 65:1359–78.

Baron, A. (2005). Build technology into strategy. *Strategic Communication Management*, 9, 13.

Becker, F. (1981). *Workspace*. New York: Praeger.

Been, I., De, & Beijer, M. (2014). The influence of office type on satisfaction and perceived productivity support. *Journal of Facilities Management*, Vol. 12, No. 2, 2014, pp. 142-157. Centre for People and Buildings, Delft, The Netherlands.

Been, I., De, Voordt, D. J. M., van der & Haynes, B. P. (2016). 9. *Productivity*.

Benet-Martínez, V., & John, O. P. (1998). 'Los Cinco Grandes' Across cultures and ethnic groups: Multitrait-multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology*, 75, 729–750.

Bengtsson, J. (2003). Low frequency noise during work—effects on performance and annoyance. Unpublished doctoral dissertation, Sahlgrenska Academy, Göteborgs University, Göteborg, Sweden.

Berg, J. C., van den (2017). Preferred workspace and building characteristics that affect knowledge worker productivity. Master thesis, Eindhoven: Eindhoven University of Technology.

Berghel, H. (1997). E-mail – the good, the bad and the ugly. *Communications of the ACM*, 40, 11–15.

Berry, W. D. (1993). Understanding regression assumptions. Sage university paper series on quantitative applications in the social sciences, 07-092. Newbury Park, CA: Sage.

Bijl, D. (2009). *Aan de slag met het nieuwe werken*. Zeewolde: ParCC.

Bitner, M. J. (1992). Servicescapes: the impact of physical surroundings on customers and Employees. *Journal of Marketing*, Vol. 56, pp. 57-71.

Bluyssen, P. M., Aries, M., & Dommelen, P. van (2010). Comfort of workers in office buildings: The European HOPE project. *Building and Environment*, 46 (2011), 280-288.

Blok, M. M., Groenesteijn, L., Schelvis, R., & Vink, P. (2012). New ways of working: does flexibility in time and location of work change behaviour and affect business outcomes? *Work*, 41(suppl. 1), 5075-5080.

Bodin-Danielsson, C. B., & Bodin, L. (2008). Office Type in Relation to Health, Well-Being, and Job Satisfaction Among Employees. *Environment and Behavior*. Vol. 40, No. 5, 636-668.

Bodin-Danielsson, C. B., & Bodin, L. (2009). Difference in satisfaction with office environment among employees in different office types. *Journal of Architectural and Planning Research*. 26:3, Autumn, 2009, 241-256.

Bonnefoy, X. R., Annesi-Maesona, I., Aznar, L. M., Braubachi, M., Croxford, B., Davidson, M., et al. (2004). Review of evidence on housing and health, Fourth Ministerial Conference on environment and health. Budapest: Hungary; 23e25 June 2004.

Borritz, M., Rugulies, R., Christensen, K. B., Villadsen, E., & Kristensen, T. (2006). Burnout as a predictor of self-reported sickness absence among human service workers: prospective findings from three year follow-up of the PUMA study. *J. Occup. Environ. Med.* 63:98–106.

Bowerman, B. L., & O'Connell, R. T. (1990). *Linear statistical models: An applied approach* (2nd ed.). Belmont, CA: Duxbury.

Brennan, A., Chugh, J. S., & Kline, T. (2002). Traditional versus open office design: a longitudinal field study. *Environment and Behavior*, Vol. 34 No. 3, pp. 279-299.

Brenninkmeijer, V. & VanYperen, N. (2003). How to conduct research on burnout: advantages and disadvantages of a unidimensional approach in burnout research. *Occup. Environ. Med.* 2003;60 (Suppl 1):i16–i20.

Budie, L. E. (2016). The employee in the modern work environment. Master thesis, Eindhoven: Eindhoven University of Technology.

Burton, J. (2008). *The Business Case for a Healthy Workplace*. IAPA (Industrial Accident Prevention Association) 2008.

Buss, D. M. (1987). Selection, evocation, and manipulation. *J. Personal. Soc. Psychol.* 53:1214–21.

CBS. (2014a). Werkzame beroepsbevolking: kerncijfers. *Statline*. Available at: <http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=80802NED&D1=0-1&D2=0&D3=0&D4=0&D5=0&D6=0-1,3-6,8-12,14-17&D7=0&D8=I&HDR=G3,G7,T&STB=G5,G1,G2,G4,G6&VW=T>

CBS. (2018a). Arbeidsdeelname: kerncijfers. *Statline*. Available at: <http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=82309ned&D1=2&D2=0&D3=11-22&D4=0&D5=74&HDR=G1,G2,T,G3&STB=G4&VW=T>

CBS. (2018b). Arbeidsdeelname: kerncijfers. *Statline*. Available at: <http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=82309ned&D1=2&D2=1-2&D3=0&D4=0&D5=69,74&HDR=G1,G2,G3,T&STB=G4&VW=T>

CBS. (2018c). Arbeidsdeelname: kerncijfers. *Statline*. Available at: <http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=37620&D1=1-10&D2=0&D3=0&D4=21-23&HDR=T&STB=G1,G2,G3&VW=T>

CBS. (2018d). Arbeidsdeelname: kerncijfers. *Statline*. Available at: <http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=82309ned&D1=2&D2=0&D3=0&D4=1-3&D5=74&HDR=G1,G2,T,G3&STB=G4&VW=T>

Chandrasekar, K. (2011). Workplace environment and its impact on organisational performance in public sector organisations. *International Journal of Enterprise Computing and Business Systems*, 1(1), 1-16.

Christian, M. S., Garza, A. S., & Slaughter, J. E. (2011). Work engagement: a quantitative review and test of its relations with task and contextual performance. *Pers. Psychol.* 64:89–136.

Clements-Croome, D., & Baizhan Li (1997). Assessment of the Influence of Indoor Environment on the Job Stress and Productivity of Occupants in Offices. *Healthy Buildings/IAQ '97*, pp. 495–500.

Contractor, N. S., & Eisenberg, E. M. (1990). Communication networks and new media in organizations. In J. Fulk & C. Steinfeld (Eds.), *Organizations and communication technology* (143–172). Newbury Park: Sage.

Cohen, S. (1980). Aftereffects of stress on human performance and social behaviour: A review of research and theory. *Psychological Bulletin*, 88, 82-108.

Cook, D. J., & Das, S.K. (2007). How smart are our environments? An updated look at the state of the art. *Pervasive and Mobile Computing*, Vol. 3, No. 2, pp. 53–73.

Coradi, A., Heinzen, M., & Boutellier, R. (2015). A longitudinal study of workspace design for knowledge exploration and exploitation in the research and development process. *Creativity and Innovation Management*, 24, 55-71. doi:10.1111/caim.12099

Costa, P. T. Jr., and McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual*. Odessa, FL: Psychological Assessment Resources.

Croon, E., De, Sluiter, J., Kuijer, P., & Frings-Dresen, M. (2005). The effect of office concepts on worker health and performance: a systematic review of the literature. *Ergonomics* (48:2), 119-134.

Cushman & Wakefield (2017). *Well Work Place*. Making Spaces Human Again. A Research & Insight Publication.

Danielsson, C. (2005). Office environment, health & job satisfaction. An explorative study of office design's influence. Stockholm: KTH Technology and Health, licentiate thesis in Technology and Health.

Davenport, T. H. (2005). Thinking for a living: how to get better performance and results from knowledge workers. *Harvard Business School Press*. Boston, Massachusetts.

Demerouti, E. (2006). Human resource policies for work-personal life integration. In R. Burke & C. Cooper (Eds.), *The human resources revolution: why putting people first matters* (pp.147–169). Oxford: Elsevier.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands–resources model of burnout. *J. Appl. Psychol.* 86:499–512.

Demerouti, E., & Cropanzano, R. (2010). From thought to action: employee work engagement and job performance. See Bakker & Leiter 2010, pp. 147–63.

Demerouti, E., Derks, D., Ten Brummelhuis, L. L., & Bakker, A. B. (2014). New ways of working: impact on working conditions, work-family balance, and well-being. 1-20.

Derks, D., & Bakker, A. B. (2010). The impact of e-mail communication on organizational life. Cyberpsychology. *Journal of Psychosocial Research on Cyberspace*, 4(1). <http://cyberpsychology.eu/view.php?cisloclanku=2010052401&article=1>

Devellis, R. F. (2012). *Scale development: Theory and applications* (3 ed.). California: Sage.

Dixon, M., & Ross, P. (2011). *VWork: Measuring the Benefits of Agility at Work*, Unwired Ventures.

- Drucker, P. F. (1993). *De post-kapitalistische maatschappij*. Schiedam: Scriptum.
- Duffy, F., & Tanis, J. (1993). A vision of the new workplace. *Industrial Development*, Vol. 38 No. 2, pp. 427-432.
- Earle, H. A. (2003). Building a workplace of choice: Using the work environment to attract and train top talent. *Journal of Facilities Management*, 2(3), 244-257.
- Edwards, S. (2015). Examining the relationship between workplace satisfaction and productivity. Available at: <http://www.inc.com/samuel-edwards/examining-the-relationship-between-workplace-satisfaction-and-productivity.html>
- Engelen, L., Chau, J., Young, S., Mackey, M., Jeyapalan, D., & Bauman, A. (2019). Is activity-based working impacting health, work performance and perceptions? A systematic review. *Building Research & Information*, 47(4), 468-479.
- Ethridge, D. E. (2004). *Research Methodology in Applied Economics*. John Wiley & Sons.
- Evans, G. W., & Johnson, D. (2000). Stress and open-office noise. *Journal of Applied Psychology*, 2000, Vol. 85, No. 5, 779-783.
- Field, A. (2009). *Discovering statistics using SPSS*. Sage publications.
- Fleming, D. (2005). The application of a behavioural approach to building evaluation. *Facilities*, 23(9/10), 393-415.
- Fredrickson, B. (2001). The role of positive emotions in positive psychology: the broaden-and-build theory of positive emotions. *Am. Psychol.* 56:218–26.
- French, J. R. P. Jr., Rodgers, W., & Cobb, S. (1974). *Adjustment as person-environment fit*. In Coping and Adaptation, ed. GV Coelho, DA Hamburg, JE Adams, pp. 316–33. NewYork: Basic Books.
- Freudenberger, H. J. (1974). Staff burnout. *J. Soc. Issues* 30:159–65.
- Galinsky, E., Kim, S., & Bond, J. (2001). Feeling overworked: when work becomes too much. Paper presented at the Conference Board/Families and Work Institute's Work-Life 2001 Conference, New York, NY.
- George, J. M. (2010). More engagement is not necessarily better: The benefits of fluctuating levels of engagement. In S. Albrecht (Ed.), *The handbook of employee engagement: Perspectives, issues, research, and practice* (pp. 253–263). Cheltenham, UK: Edward Elgar.
- Glass, D. C., & Singer, J. E. (1972). *Urban stress*. New York: Academic Press.
- Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment*, 4, 26–42.
- González-Romá, V., Schaufeli, W. B., Bakker, A. B., & Lloret, S. (2006). Burnout and work engagement: independent factors or opposite poles? *Journal of Vocational Behavior*, Vol. 62, pp. 165-74.

Gorgievski, M. J., Van der Voordt, T. J.M., Van Herpen, A. G. A., & Van Akkeren, S. (2010). After the fire: new ways of working in an academic setting, *Facilities*, Vol. 28 Nos 3/4, pp. 206-224.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. Jr. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37 (2003), 504-528.

Grawitch, M. J., Gottschalk, M., & Munz, D. C. (2006). The Path to a Healthy Workplace: A Critical Review Linking Healthy Workplace Practices, Employee Well-being, and Organizational Improvements. *Consulting Psychology Journal: Practice and Research*, Vol. 58, No. 3, 129–147.

Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioural Research*, 26, 499–510.

Greenglass, E. R., & Burke, R. J. (1990). Burnout over time. *Journal of Health and Human Resources Administration*, 13, 192–204.

Halbesleben, J. R. B. (2010). A meta-analysis of work engagement: relationships with burnout, demands, resources, and consequences. See Bakker & Leiter 2010, pp. 102–11.

Halbesleben, J. R. B. (2011). The consequences of engagement: The good, the bad, and the ugly. *European Journal of Work and Organizational Psychology*, 20(1), 68–73.

Harpaz, I. (2002). Advantages and disadvantages of telecommuting for the individual, organization and society. *Work Study*, Vol. 51 Issue: 2, pp.74-80, <https://doi.org/10.1108/00438020210418791>

Hartog, L. M. (2015). User satisfaction in multi-tenant offices. Master thesis, Eindhoven: Eindhoven University of Technology.

Haynes, B. P. (2007a). Office productivity: a theoretical framework. *Journal of Corporate Real Estate*, Vol. 9 Iss 2 pp. 97 – 110.

Haynes, B. P. (2007b). The Impact of the Behavioural Environment on Office Productivity. *Journal of Facilities Management*, Vol. 5 No. 3, 2007 pp. 158-171.

Haynes, B. P., & Price, I. (2004). Quantifying the complex adaptive workplace. *Facilities*, Vol. 22 No. 1, pp. 8-18.

Heerwagen, J. (1990). The psychological aspects of windows and window design. Paper presented at the EDRA 21st annual conference “Windows, windowlessness and simulated view,” Polytechnic Institute of New York, Brooklyn.

Heerwagen, J. H., Kampschroer, K., Powell, K. M., & Loftness, V. (2004). Collaborative knowledge work environments. *Building Research & Information*, 32, 510-528. doi:10.1080/09613210412331313025

Hillhouse, J. J., Adler, C. M., & Walters, D. N. (2000). A simple model of stress, burnout and symptomatology in medical residents: a longitudinal study. *Psychol. Health Med.* 5:63–73.

Hoendervanger, J. G., le Noble, V., Mobach, M. P., & Van Yperen, N. W. (2015). Tool development for measuring and optimizing workplace utilization in activity-based work environments. *14th EuroFM Research Symposium*. EuroFM Research Papers 2015.

- Hoendervanger, J.G., De Been, I., Van Yperen, N.W., Mobach, M.P., & Albers, C.J. (2016). Flexibility in use: Switching behaviour and satisfaction in activity-based work environments. *Journal of Corporate Real Estate*, 18. (1), 48-62.
- Hooftman, W. E., Mars, G.M.J., Janssen, B., de Vroome, E. M. M., Janssen, B. J. M., Michiels, J. E. M., et al. (2016). *Nationale Enquête Arbeidsomstandigheden 2015: Methodologie en Globale Resultaten*. Leiden/Heerlen: TNO/CBS; 2016.
- IBM Corp. (2015). *IBM SPSS Statistics for Windows*, Version 23.0. Armonk, NY: IBM Corp.
- Institute for Work & Health [IWH] (2015). *At Work*, Issue 81, Summer 2015: Institute for Work & Health, Toronto.
- Jantunen, M. J., Hänninen, O., Katsouyanni, K., Knöppel, H., Keunzli, N., Lebrete, E., et al. (1998). Air pollution exposure in European cities: the expolis study. *JEAE* 1998;8 (4):495-518.
- John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin, & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 102–138). New York: Guilford Press.
- Kabo, F., Hwang, Y., Levenstein, M., & Owen-Smith, J. (2015). Shared paths to the lab: A sociospatial network analysis of collaboration. *Environment and Behavior*, 47, 57-84. doi:10.1177/0013916513493909
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Acad. Manag. J.* 33:692–724.
- Kahn, R. L., & Byosiére, P. (1992). Stress in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (Vol. 3, pp. 571–650). Palo Alto, CA: Consulting Psychologists Press.
- Karasek, R., Baker, D., Marxer, F., Ahlbom, A., & Theorell, R. (1981). Job Decision Latitude, Job Demands, and Cardiovascular Disease: A Prospective Study of Swedish Men. *Am J Public Health* 1981; 71:694-705.
- Kaufman L. M. (2009). Data Security in the World of Cloud Computing. *IEEE Security & Privacy*, Vol. 7, No. 4, pp. 61–64. DOI: 10.1109/MSP.2009.87
- Kim, H. J., Ji, J., & Kao, D. (2011). Burnout and physical health among social workers: a three-year longitudinal study. *Soc. Work* 56:258–68.
- Kleijn, M., Appel-Meulenbroek, R., Kemperman, A., & Els, H. (2012). CREM and activities at the modern workplace: A study of the variables influencing the use of workplaces in an activity based office design (No. eres2012_224). *European Real Estate Society (ERES)*.
- Kirsten, W. (2010). Making the Link between Health and Productivity at the Workplace – a Global Perspective. *Industrial Health*, 2010, 48, 251-255.

- Koetsveld, R., van & Kamperman, L. (2011). How flexible workplace strategies can be made successful at the operational level. *Corporate Real Estate Journal*, Vol. 1 No. 4, pp. 303-319.
- Krumm, P. J. M. M., & Vries, J. de (2003). Value creation through the management of corporate real estate. *Journal of Property Investment & Finance*, 21(1), 61-72.
- Laihonen, H., Jääskeläinen, A., Lönnqvist, A., & Ruostela, J. (2012). Measuring the productivity impacts of new ways of working. *Journal of Facilities Management*, Vol. 10 No. 2, pp. 102-113.
- Landsbergis, P. A. (1988). Occupational stress among health care workers: A test of the job demands–control model. *Journal of Organizational Behavior*, 9, 217–239.
- Leaman, A., & Bordass, W. (2000). *Productivity in buildings: the ‘killer’ variables*, in Clements-Croome, D. (Ed.), *Creating the Productive Workplace*, E&FN Spon, London.
- Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *J. Appl. Psychol.* 8:123–33.
- Lee, S. Y., & Brand, J. L. (2005). Effects of control over office workspace on perceptions of the work environment and work outcomes. *Journal of Environmental Psychology*, 25(3), 323-333.
- Lees, D. Y., & Thomas, P.J. (1998). Designing information artefacts for knowledge workers. *Personal and Ubiquitous Computing*, Vol. 2, No. 4, pp. 231–240.
- Leesman (2017). *The next 250k*. Five key results that influence workplace performance. Marylebone, London.
- Leiter, M. P. (2005). Perception of risk: An organizational model of burnout, stress symptoms, and occupational risk. *Anxiety, Stress, & Coping*, 18, 131–144.
- Leiter, M. P., Day, A., Harvie, P., & Shaughnessy, K. (2007). Personal and organizational knowledge transfer: Implications for work life engagement. *Human Relations*, 60, 259–283.
- Leiter, M. P., & Harvie, P. (1997). The correspondence of supervisor and subordinate perspectives on major organizational change. *Journal of Occupational Health Psychology*, 2, 1–10.
- Leiter, M. P., & Maslach, C. (1988). The impact of interpersonal environment on burnout and organizational commitment. *Journal of Organizational Behavior*, 9, 297–308.
- Leiter, M. P., & Maslach, C. (2004). Areas of worklife: A structured approach to organizational predictors of job burnout. In P. Perrewé & D. C. Ganster, (Eds.), *Research in occupational stress and well-being: Vol. 3*. Emotional and physiological processes and positive intervention strategies: 91-134. Oxford, UK: JAI Press/Elsevier.
- Leiter, M. P., & Maslach, C. (2005). *A mediation model of job burnout*. In A. S. G. Antoniou & C. L. Cooper (Eds.), *Research companion to organizational health psychology* (pp. 544–564). Cheltenham, United Kingdom: Edward Elgar.

Locke, P. (2005). A tool for assessing corporate intranets to increase the productivity of mobile knowledge workers: An evaluation of a handheld wireless device. Unpublished dissertation, Capella University.

Lowe, G. S. (2004). *Healthy Workplace Strategies. Creating Change and Achieving Results*. The Graham Lowe Group Inc., 2004.

Maarleveld, M., Volker, L., & Van der Voordt, D. J. M. (2009). Measuring employee satisfaction in new offices - the WODI toolkit. *Journal of Facilities Management*, 7(3), 181-197.

Maslach, C., & Jackson, S. E. (1981a). *The Maslach Burnout Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Maslach, C., & Jackson, S. E. (1981b). The measurement of experienced burnout. *Journal of Occupational Behavior*, 2, 99–113.

Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach Burnout Inventory manual* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Maslach, C., & Leiter, M. P. (1997). *The Truth About Burnout: How Organizations Cause Personal Stress and What to Do About It*. San Francisco, CA: Jossey-Bass.

Maslach, C., & Leiter, M. P. (2000). Burnout. *Elsevier Inc., 2000. Vol. 1*, pp 358-362. Revision: Elsevier Inc., 2007. pp 368-371.

Maslach, C., & Leiter, M. P. (2005). Stress and burnout: The critical research. In C. L. Cooper (Ed.), *Handbook of stress medicine and health* (2nd ed., pp. 153–170). London: CRC Press.

Maslach, C., & Leiter, M. P. (2008). Early Predictors of Job Burnout and Engagement. *Journal of Applied Psychology*. 2008, Vol. 93, No. 3, 498-512.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job Burnout. *Annual Review Psychology*, 2001. 52: 397-422.

Mauno, S., Kinnunen, U., & Ruokolainen, M. (2007). Job demands and resources as antecedents of work engagement: a longitudinal study. *J. Vocat. Behav.* 70:149–71.

Mawson, A. (2002). *The Workplace and its Impact on Productivity*, 4.Publication No. 8, Advanced Workplace Associates, London.

Meijer, E. M., Frings-Dresen, M. H. W., & Sluiter, J. K. (2009) Effects of office innovation on office workers' health and performance, *Ergonomics*, 52:9, 1027-1038, DOI: 10.1080/00140130902842752

Menard, S. (1995). *Applied logistic regression analysis*. Sage university paper series on quantitative applications in the social sciences, 07-106. Thousand Oaks, CA: Sage.

Meulensteen, K. W. (2017). Identifying the underlying process that relates aspects of the physical work environment with employee work performance. Master thesis, Eindhoven: Eindhoven University of Technology.

Middleton, C. (2007). Illusions of balance and control in an always-on environment: a case study of BlackBerry users. Continuum. *Journal of Media & Cultural Studies*.
<http://www.tandf.co.uk/journal/titels/>

Molin. (2014). *Research methods Part 2* [Lecture presentation for subject Onderzoek en Statistiek]. University of Technology, Delft.

Mynatt, E.D., Huang, E.M., Volda, S., & MacIntyre, B. (2003). *Large displays for knowledge work*. In: O'Hara, K. et al. (Eds.) *Public and Situated Displays. Social and Interactional Aspects of Shared Display Technologies*. Kluwer Academic Publishers, 2003.

OECD (1996). Organization for economic co-operation and development. *The knowledge-based economy*. General distribution OCDE//GD(96)102, 1996.

Oladokun, T. T. (2010). Towards value-creating corporate real estate assets management in emerging economies. *Journal of Property Investment & Finance*, Vol. 28 No. 5, pp. 354-364.

Oldham, G. R., & Rotchford, N. L. (1983). Relationship between office characteristics and employee reactions: a study of the physical environment. *Administrative Science Quarterly*, 28, pp. 542 – 556.

Olson, J. (2002). Research about office workplace activities important to US business - and how to support them. *Journal of Facilities Management*, Vol. 1 No. 1, pp. 31-47.

Oseland, N. (1999). *Environmental factors affecting office worker performance: a review of evidence*, Technical Memoranda TM24, CIBSE, London.

Oseland, N. (2004). *Occupant feedback tools of the office productivity network*. Available at: www.officeproductivity.co.uk

Pallant, J. (2010). *SPSS Survival Manual*. A step by step guide to data analysis using SPSS (4th ed.). Berkshire: McGraw-Hill.

Pallant, J. (2016). *SPSS Survival Manual* (6 ed.): Open University Press.

Parker, S. K., Bindl, U., & Strauss, K. (2010). Making things happen: a model of proactive motivation. *J. Manag.* 36:827–56.

Parker, S. K., & Griffin, M. A. (2011). Understanding active psychological states: Embedding engagement in a wider nomological net and closer attention to performance. *European Journal of Work and Organizational Psychology*, 20(1), 60–67.

Peponis, J., Bafna, S., Bajaj, R., Bromberg, J., Congdon, C., Rashid, M., . . . Zimring, C. (2007). Designing space to support knowledge work. *Environment and Behavior*, 39, 815-840. doi:10.1177/0013916506297216

Perry, M., & Brodie, J. (2005). *Virtually connected, practically mobile*. In: Andriesson, E. & Vartiainen, M. (Eds.). *Mobile Virtual Work: A New Paradigm*. Berlin: Springer. Pp. 97–127.

Peters, P., & Van der Lippe, T. (2007). The time-pressure reducing potential of telehomeworking: the Dutch case. *International Journal of Human Resource Management*, 18, 430–447.

Pick, D., & Leiter, M. P. (1991). Nurses' perceptions of the nature and causes of burnout: a comparison of self-reports and standardized measures. *Can. J. Nurs. Res.* 23:33–48.

Pole, S., & Mackay, D. (2009). Occupancy cost reduction: proven techniques for these tough times. *The Leader*, Vol. 8 No. 4, pp. 12-17.

Pullen, W., & Bradley, S. (2004). Modernising government workplaces: towards evidence, as well as experience. *Facilities*, 22, 70–73.

Pyöriä, P. (2005). The concept of knowledge work revisited. *Journal of knowledge management*, Vol. 9, No. 3, pp. 116–127.

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 (2007), 203-212.

Rashid, M., & Zimring, C. (2008). A review of the empirical literature on the relationships between indoor environment and stress in health care and office settings: problems and prospects of sharing evidence. *Environment and Behavior*, Vol. 40 No. 2, pp. 151-190.

Rashid, M., Kampschroer, K., Wineman, J., & Zimring, C. (2006). Spatial layout and face-to-face interaction in offices: A study of the mechanisms of spatial effects on face-to-face interaction. *Environment and Planning B*, 33, 825-844. doi:10.1068/b31123

Ree, H. J., van (2002). The added value of office accommodation to organisational performance. *Work study*, 51(7), 357-363.

Renaud, K., Ramsay, J., & Hair, M. (2006). You've got mail...Shall I deal with it now? Electronic mail from a recipient's perspective. *Journal of Human-Computer Interaction*, 21, 313–332.

Rennecker, J., & Derks, D. (2012). *Email overload: fine tuning the research lens*. In D. Derks & A. B. Bakker (Eds.), *The psychology of digital media @ work*. London, UK: Psychology Press.

Richardsen, A. M., Burke, R. J., & Leiter, M. P. (1992). Occupational demands, psychological burnout, and anxiety among hospital personnel in Norway. *Anxiety, Stress, & Coping*, 5, 62–78.

Robin, R. (2003). Healthy, wealthy, and wise. *Canadian Business*, 76, 129.

Roelofsen, P. (2002). The impact of office environments on employee performance: The design of the workplace as a strategy for productivity enhancement. *Journal of facilities Management*, 1(3), 247-264.

Ross, P. (2010). *Activity based working*. The hybrid organisation: Buildings. Microsoft.

Rothe, P., Lindholm, A.-L., Hyvönen, A., & Nenonen, S. (2011). User preferences of office occupiers: investigating the differences. *Journal of Corporate Real Estate*, 13(2), 81-97.

Rothe, P., Lindholm, A.-L., Hyvönen, A., & Nenonen, S. (2012). Work environment preferences – does age make a difference?. *Facilities*, 30(1/2), 78-95.

- Rubinstein, J. S., Meyer, D. E., & Evans, J. E. (2001). Executive control of cognitive processes in task switching. *Journal of Experimental Psychology: Human Perception and Performance*, 27, 763–797.
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological review*, 110(1), 145.
- Russell, W., Purvis, L. M., & Banks, A. (2005). Describing the strategies used for dealing with email interruptions according to different situational parameters. *Computers in Human Behavior*, 23, 1820–1837.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.
- Sánchez, A. M., Pérez, M. P., de Luis Carnicer, P., & Jiménez, M. J. V. (2007). Teleworking and workplace flexibility: a study of impact on firm performance. *Personnel Review*, Vol. 36 Issue: 1, pp.42-64, <https://doi.org/10.1108/00483480710716713>
- Sarbaugh-Thompson, M., & Feldman, M. S. (1998). Electronic mail and organizational communication: does saying “hi” really matter? *Organizational Science*, 9, 685–698.
- Sauter, S. L., & Murphy, L. R. (Eds.). (1995). *Organizational risk factors for job stress*. Washington, DC: American Psychological Association.
- Sauter, S., Lim, S., & Murphy, L. (1996). Organizational health: A new paradigm for occupational stress research at NIOSH. *Japanese Journal of Occupational Mental Health*, 4, 248–254.
- Schaufeli, W. B., & Bakker, A. B. (2003). *UWES – utrecht work engagement scale: test manual*. Department of Psychology, Utrecht University, Utrecht. Available at: www.schaufeli.com
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study. *J. Organ. Behav.* 25:293–315.
- Schaufeli, W. B., & Bakker, A. B. (2004). *UWES–Utrecht work engagement scale: test manual*. Unpublished Manuscript: Department of Psychology, Utrecht University.
- 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(4), 701–716.
- Schaufeli, W. B., Bakker, A. B., & Van Rhenen, W. (2009a). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *J. Organ. Behav.* 30:893–917.
- Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis*. London: Taylor & Francis.
- Schaufeli, W. B., Leiter, M. P., & Maslach, C. (2009b). Burnout: thirty-five years of research and practice. *Career Dev. Int.* 14:204–20.
- Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). *The Maslach Burnout Inventory–General Survey*. In MBI Manual, ed. C. Maslach, S.E. Jackson, M.P. Leiter, pp. 19–26. Palo Alto, CA: Consult. Psychol. 3rd ed.

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of burnout and engagement: a confirmatory factor analytic approach. *J Happiness Stud.* 3:71–92.

Schaufeli, W. B., & Van Rhenen, W. (2006). Over de rol van positieve en negatieve emoties bij het welbevinden van managers: een studie met de Job-related Affective Well-being Scale (JAWS) [About the role of positive and negative emotions in managers' well-being: a study using the Job-related Affective Well-being Scale (JAWS)]. *Gedrag Organ.* 19:323–44.

Semmer, N. (1996). *Individual differences, work stress, and health*. In Handbook of Work and Health Psychology, ed. MJ Schabracq, JAM Winnubst, CL Cooper, pp. 51–86. Chichester, UK: Wiley.

Seppanen, O. A., & Fisk, W. J. (2006). *Some Quantitative Relations between Indoor Environmental Quality and Work Performance or Health*. Lawrence Berkeley National Laboratory, Berkeley, CA.

Shirom, A., Melamed, S., Toker, S., Berliner, S., & Shapira, I. (2005). Burnout and health review: current knowledge and future research directions. *Int. Rev. Ind. Organ. Psychol.* 20:269–307.

Sonnentag, S., Mojza, E. J., Demerouti, E., & Bakker, A. B. (2012). Reciprocal relations between recovery and work engagement: the moderating role of job stressors. *J. Appl. Psychol.* 97:842–53.

Stallworth, O. E., & Kleiner, B. H. (1996). Recent developments in office design. *Facilities*, 14(1/2), 34–42.

Streitz, N., Prante, T., Röcker, C., van Alphen, D., Stenzel, D., Magerkurth, C., Lahlou, S., Nosulenko, V., Jegou, F., Sonder, F., & Plewe, D. (2007). *Smart Artefacts as Affordances for Awareness in Distributed Teams*. In: Streitz, N., Kameas, A. & Mavrommati, I. (Eds.). *The Disappearing Computer*, LNCS 4500. Berlin, Heidelberg: Springer-Verlag. Pp. 3–29.

Sundstrom, E. (1986). *Workplaces*. New York: Cambridge University Press.

Sundstrom, E., Town, J., Rice, R., Osborn, D., & Brill, M. (1994). Office noise, satisfaction, and performance. *Environment and Behavior*, 26, 195–222.

Susante, P. J. M. van (2015). Differences in employee satisfaction in new versus traditional work environments. Master thesis, Eindhoven: Eindhoven University of Technology.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn & Bacon.

Tabak, V. (2009). User simulation of space utilisation: system for office building usage simulation. Eindhoven: Technische Universiteit Eindhoven.

Teasley, S., Covi, L., Krishnan, M. S., & Olson, J. S. (2000). *How does radical collocation help a team succeed?*. In: Proceedings of the 2000 ACM conference on Computer supported cooperative work (CSCW '00). New York, NY, USA: ACM. Pp. 339–346. DOI=10.1145/358916.359005 <http://doi.acm.org/10.1145/358916.359005>

Ten Brummelhuis, L. L., & Bakker, A. B. (2012). Staying engaged during the week: the effect of off-job activities on next day work engagement. *J. Occup. Health Psychol.* 17:445–55.

Thomas, G. F., King, C. L., Baroni, B., Cook, L., Keitelman, M., Miller, S., & Wardle, A. (2006). Reconceptualizing e-mail overload. *Journal of Business and Technical Communication*, 20, 252–287.

TNO (2015). Factsheet TNO: Werkstress, Burn-out & Verzuim in Cijfers. Gepubliceerd op 16-11-2015 door Ministerie van Sociale Zaken en Werkgelegenheid.

Ursin, H., & Eriksen, H. R. (2004). The cognitive activation theory of stress. *Psychoneuroendocrinology*, 29, 567–592.

Vanheule, S., Rosseel, Y., Vlerick, P., Van de Ven, B., & Declercq, F. (2012). Onderzoeksnotitie: De factoriële validiteit en meetinvariantie van de Utrechtse Burnout Schaal (Algemene versie: UBOS-A). *Gedrag & Organisatie* 2012 (25) 2.

Vartiainen, M., Hakonen, M., Koivisto, S., Mannonen, P., Nieminen, M.P., Ruohomäki, V., & Vartola, A. (2007). *Distributed and Mobile Work – Places, People and Technology*. Helsinki: University Press Finland.

Veldhoen, E. (2008). *The Art of Working*. Academic Service.

Vischer, J. C. (2007). The effects of the physical environment on job performance: towards a theoretical model of workspace stress. *Stress and Health*, Vol. 23 No. 3, pp. 175-184.

Vischer, J. C. (2008a). Towards an environmental psychology of workspace: How people are affected by environments for work. *Architectural Science Review*, Vol. 51, No. 2, pp. 97–108.

Vischer, J. C. (2008b). Towards a user-centred theory of the build environment. *Building Research & Information*, Vol. 36, No. 3, pp. 231–240.

Voordt, D. J. M., van der (2004). Productivity and employee satisfaction in flexible workplaces. *Journal of Corporate Real Estate*, Vol. 6, No. 2., pp. 133-148.

Voordt, D. J. M., van der & Vos, P. G. J. C. (1999). *Evaluatie van kantoorinnovatie: model en methoden*. [Evaluation of Office Innovation: Model and Methods], Delft University Press.

Vos, P. G. J. C., & Voordt, D. J. M. van der (2001). Tomorrow's offices through today's eyes: Effects of innovation in the working environment. *Journal of Corporate Real Estate*, 4(1), 48-65.

Vos, P. G. J. C., van Meel, J. J., & Dijcks, A. (1999). *The Office, the Whole Office and Nothing But the Office: A Framework of Workplace Concepts*. Version 1.2, Real Estate & Project Management, Faculty of Architecture, Delft University of Technology.

Vosters, S. M. C. (2017). Attracting and retaining millennials: The contribution of Corporate Real Estate. Master thesis, Eindhoven: Eindhoven University of Technology.

Wang, Z., & Wang, N. (2012). *Knowledge sharing, innovation and firm performance*. Expert Systems With Applications, 39, 8899-8908.

Warr, P. (1987). *Work, unemployment and mental health*. Oxford, Clarendon Press.

Whitley, T. D. R., Makin, P. J., & Dickson, D. J. (1996). Job satisfaction and locus of control: impact on sick building syndrome and self-reported productivity, paper presented at 7th International Conference on Indoor Air Quality and Climate, Nagoya.

World Green Building Council (2016). *Health, Wellbeing and Productivity in Green Offices*.

Worthington, J. (1997). *Reinventing the Workplace*, University of York, Oxford.

Wright, T. A., & Bonett, D. G. (1997). The contribution of burnout to work performance. *J. Organ. Behav.* 18:491–99.

Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job: revisioning employees as active crafters of their work. *Acad. Manag. Rev.* 26:179–201.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009a). Reciprocal relationships between job resources, personal resources, and work engagement. *J. Vocat. Behav.* 74:235–44.

Zedeck, S., & Mosier, K. L. (1990). Work in the family and employing organization. *American Psychologist*, 45, 240–251.

List of figures

Figure 0	Cover page.....	i
Figure 1	Overview of conceptual model after bivariate analyses.....	ix
Figure 2	Research outcomes: overview of variables that have a significant relationship with the BEC dimensions	x
Figure 1.1	Conceptual model.....	5
Figure 1.2	Research design.....	8
Figure 2.1	A two-dimensional view of subjective well-being.....	17
Figure 2.2	Conceptual model – elaboration of the burnout – engagement continuum components.....	23
Figure 3.1	The complex environment of new ways of working.....	30
Figure 3.2	Conceptual model – elaboration of the physical environment component.....	46
Figure 5.1	Distribution of age.....	66
Figure 5.2	Distribution of age classes.....	66
Figure 5.3	Distribution of years of employment.....	68
Figure 5.4	Distribution of years of employers.....	69
Figure 5.5	Distribution of extraversion personality trait.....	74
Figure 5.6	Distribution of agreeableness personality trait.....	74
Figure 5.7	Distribution of conscientiousness personality trait.....	75
Figure 5.8	Distribution of neuroticism personality trait.....	75
Figure 5.9	Distribution of openness personality trait.....	76
Figure 5.10	Perceive importance of knowledge worker activities.....	81
Figure 6.1	Conceptual model – elaboration of the constructs after data reduction.....	89
Figure 7.1	Multiple regression analyses – model I.....	105
Figure 7.2	Multiple regression analyses – model II.....	105
Figure 7.3	Multiple regression analyses model I – individual strain dimension.....	106
Figure 7.4	Multiple regression analyses model II – individual strain dimension.....	107
Figure 7.5	Multiple regression analyses model I – interpersonal strain dimension.....	108
Figure 7.6	Multiple regression analyses model II – interpersonal strain dimension.....	109
Figure 7.7	Multiple regression analyses model I – self-evaluation strain dimension.....	110
Figure 7.8	Multiple regression analyses model II – self-evaluation strain dimension.....	111
Figure 7.9	Multiple regression analyses results – individual strain dimension.....	123
Figure 7.10	Multiple regression analyses results – interpersonal strain dimension.....	123
Figure 7.11	Multiple regression analyses results – self-evaluation strain dimension.....	124
Figure 8.1	Input variables multiple regression analyses.....	126
Figure 8.2	Research outcomes: overview of variables that have a significant relationship with the BEC dimensions.....	129
Figure H.1.1	Situational variables: distribution of overload variable.....	184
Figure H.1.2	Situational variables: distribution of control variable.....	184
Figure H.1.3	Situational variables: distribution of authority variable.....	184
Figure H.1.4	Situational variables: distribution of participation variable.....	184

Figure H.1.5	Situational variables: distribution of financial rewards variable.....	184
Figure H.1.6	Situational variables: distribution of social rewards variable.....	184
Figure H.1.7	Situational variables: distribution of intrinsic rewards variable.....	184
Figure H.1.8	Situational variables: distribution of co-worker support variable.....	184
Figure H.1.9	Situational variables: distribution of supervisor support variable.....	184
Figure H.1.10	Situational variables: distribution of input – output variable.....	185
Figure H.1.11	Situational variables: distribution of trade-off variable.....	185
Figure I.2	Factor analyses: situational variables – Screeplot.....	187
Figure J.1.1	BEC: distribution of emotionally drained variable.....	188
Figure J.1.2	BEC: distribution of feeling used up variable.....	188
Figure J.1.3	BEC: distribution of fatigued variable.....	188
Figure J.1.4	BEC: distribution of working all day strain variable.....	188
Figure J.1.5	BEC: distribution of burned out variable.....	188
Figure J.2.1	BEC: distribution of enthusiastic variable.....	188
Figure J.2.2	BEC: distribution of cynical variable.....	188
Figure J.2.3	BEC: distribution of distant attitude variable.....	188
Figure J.2.4	BEC: distribution of meaning - purpose variable.....	188
Figure J.3.1	BEC: distribution of dealing with problems effectively variable.....	189
Figure J.3.2	BEC: distribution of influencing work positively variable.....	189
Figure J.3.3	BEC: distribution of exhilarated variable.....	189
Figure J.3.4	BEC: distribution of accomplished worthwhile things variable.....	189
Figure J.3.5	BEC: distribution of confident variable.....	189
Figure J.3.6	BEC: distribution of good at work variable.....	189
Figure K.1.1	Office layout supportiveness: distribution of variety best workplace variable.....	190
Figure K.1.2	Office layout supportiveness: distribution of suitable workplace variable.....	190
Figure K.1.3	Office layout supportiveness: distribution of open and transparent variable.....	190
Figure K.1.4	Office layout supportiveness: distribution of movement variable.....	190
Figure K.1.5	Office layout supportiveness: distribution of spatial design variable.....	190
Figure K.1.6	Office layout supportiveness: distribution of workspace allocation variable.....	190
Figure K.1.7	Office layout supportiveness: distribution of distraction variable.....	190
Figure K.1.8	Office layout supportiveness: distribution of facilities support variable.....	190
Figure K.2.1	Perceived office comfort: distribution of temperature variable.....	190
Figure K.2.2	Perceived office comfort: distribution of heating variable.....	190
Figure K.2.3	Perceived office comfort: distribution of ventilation variable.....	190
Figure K.2.4	Perceived office comfort: distribution of lighting variable.....	191
Figure K.2.5	Perceived office comfort: distribution of air quality variable.....	191
Figure K.2.6	Perceived office comfort: distribution of personal control variable.....	191
Figure K.2.7	Perceived office comfort: distribution of ergonomic chairs variable.....	191
Figure K.2.8	Perceived office comfort: distribution of adjustable desks variable.....	191
Figure K.2.9	Perceived office comfort: distribution of overall ergonomics variable.....	191
Figure K.2.10	Perceived office comfort: distribution of overall comfort variable.....	191
Figure K.3.1	Accessibility to ICT: distribution of cloud computing variable.....	191
Figure K.3.2	Accessibility to ICT: distribution of mobile tools variable.....	191
Figure K.3.3	Accessibility to ICT: distribution of intranet variable.....	191

Figure K.4.1	Office use: distribution of choose best workspace variable.....	192
Figure K.4.2	Office use: distribution of clear out workspace variable.....	192
Figure K.4.3	Office use: distribution of leave to original set up variable.....	192
Figure K.4.4	Office use: distribution of claiming workspace variable.....	192
Figure K.4.5	Office use: distribution of social interaction variable.....	192
Figure K.4.6	Office use: distribution of work related interaction variable.....	192
Figure K.4.7	Office use: distribution of interruptions variable.....	192
Figure K.4.8	Office use: distribution of crowding variable.....	192
Figure K.4.9	Office use: distribution of noise variable.....	192
Figure K.4.10	Office use: distribution of privacy variable.....	192
Figure K.5.1	Possibility to telework: distribution of home variable.....	193
Figure K.5.2	Possibility to telework: distribution of home - work variable.....	193
Figure L.2	Factor analyses: office use – Screeplot.....	194
Figure N.1.1	Histogram residuals individual strain.....	197
Figure N.1.2	Normal p-p plot residuals individual strain.....	197
Figure N.1.3	Scatterplot residuals individual strain.....	197
Figure N.2.1	Histogram residuals interpersonal strain.....	198
Figure N.2.2	Normal p-p plot residuals interpersonal strain.....	198
Figure N.2.3	Scatterplot residuals interpersonal strain.....	198
Figure N.3.1	Histogram residuals self-evaluation strain.....	199
Figure N.3.2	Normal p-p plot residuals self-evaluation strain.....	199
Figure N.3.3	Scatterplot residuals self-evaluation strain.....	199

List of tables

Table 2.1	Overview of individual control variables that may influence the burnout – engagement continuum.....	19
Table 2.2	Overview burnout – engagement continuum components.....	22
Table 3.1	Overview of proposed components and attributes of the physical environment.....	27
Table 3.2	Overview of characteristics and attributes that may influence the ABO from a burnout – engagement continuum point of view.....	33
Table 3.3	Knowledge worker activities.....	34
Table 4.1	Operationalisation socio-demographic characteristics.....	48
Table 4.2	Operationalisation personality characteristics.....	50
Table 4.3	Operationalisation situational variables.....	51
Table 4.4	Operationalisation burnout characteristics.....	53
Table 4.5	Operationalisation activities.....	54
Table 4.6	Operationalisation physical workplace characteristics.....	54
Table 4.7	Operationalisation office layout characteristics.....	55
Table 4.8	Operationalisation office comfort characteristics.....	55
Table 4.9	Operationalisation information and communication technology, office use and office location characteristics.....	56
Table 5.1	Distribution of gender.....	66
Table 5.2	Distribution of education level.....	67
Table 5.3	Distribution of household compositions.....	67
Table 5.4	Distribution of number of employers.....	69
Table 5.5	Distribution of job ranks.....	70
Table 5.6	Distribution of respondents' contractual situation.....	70
Table 5.7	Distribution of average workhours per week.....	71
Table 5.8	Distribution of average workhours per week at the office and the average workhours per week away from the office.....	71
Table 5.9	Distribution of expectations.....	72
Table 5.10	Distribution of expectation results.....	72
Table 5.11	Cross Table expectations*results.....	72
Table 5.12	Internal consistency of personality traits.....	73
Table 5.13	Frequencies of extraversion personality trait.....	74
Table 5.14	Frequencies of agreeableness personality trait.....	74
Table 5.15	Frequencies of conscientiousness personality trait.....	75
Table 5.16	Frequencies of neuroticism personality trait.....	75
Table 5.17	Frequencies of openness personality trait.....	76
Table 5.18	Factor analysis for situational variables.....	78
Table 5.19	Distribution of individual strain dimension.....	80
Table 5.20	Distribution of interpersonal strain dimension.....	80
Table 5.21	Distribution of self-evaluation strain dimension.....	81
Table 5.22	Distribution of office layout supportiveness.....	82
Table 5.23	Distribution of perceived office comfort.....	83
Table 5.24	Distribution accessibility to ICT.....	85
Table 5.25	Distribution of office use.....	85
Table 5.26	Factor analysis for office use.....	87
Table 5.27	Distribution of office location (possibility to telework).....	87

Table 6.1	Bivariate analyses between knowledge worker activities and BEC.....	90
Table 6.2	Bivariate analyses between office layout supportiveness and BEC.....	90
Table 6.3	Bivariate analyses between perceived office comfort and BEC.....	91
Table 6.4	Bivariate analyses between accessibility to ICT and BEC.....	92
Table 6.5	Bivariate analyses between office use and BEC.....	93
Table 6.6	Bivariate analyses between possibility to telework and BEC.....	93
Table 6.7	Bivariate analyses between situational variables and BEC.....	94
Table 6.8	Bivariate analyses between personality and BEC.....	95
Table 6.9	Bivariate analyses between socio-demographics and BEC.....	97
Table 6.10	Bivariate analyses between gender and BEC.....	97
Table 6.11	Bivariate analyses between work-related variables and BEC.....	98
Table 6.12	Bivariate analyses between job rank and BEC.....	99
Table 6.13	Bivariate analyses between contract (nature) and BEC.....	99
Table 6.14	Bivariate analyses between expectations (potentials) and BEC.....	100
Table 6.15	Overview bivariate analyses.....	101
Table 7.1	MRA – Model I: individual strain dimension.....	106
Table 7.2	MRA – Model II: individual strain dimension.....	107
Table 7.3	MRA – Model I: interpersonal strain dimension.....	108
Table 7.4	MRA – Model II: interpersonal strain dimension.....	109
Table 7.5	MRA – Model I: self-evaluation strain dimension.....	110
Table 7.6	MRA – Model II: self-evaluation strain dimension.....	111
Table 7.7	MRAs individual strain dimension.....	112
Table 7.8	MRAs interpersonal strain dimension.....	114
Table 7.9	MRAs self-evaluation strain dimension.....	117
Table 7.10	Bivariate analyses – Physical workplace characteristics * Situational variables.....	120
Table 8.1	Physical workplace characteristics.....	133
Table A.1	Situational variables correlated with the BEC (burnout).....	157
Table A.2	Situational variables correlated with the BEC (engagement).....	158
Table A.3	Control variables correlated with the BEC.....	158
Table B.1	Physical workplace characteristics.....	159
Table D.1	UBOS-GS (Dutch).....	175
Table D.2	UBOS-GS (English).....	176
Table E.1	Codebook.....	177
Table F.1	Chi-Square test for gender.....	181
Table F.2	T-Test for average age.....	181
Table F.3	Chi-Square test for education level.....	181
Table F.4	Chi-Square test for household composition.....	181
Table G.1	Cronbach's α test for extraversion.....	182
Table G.2	Inter-item correlation test for extraversion.....	182
Table G.3	Cronbach's α test for agreeableness.....	182
Table G.4	Inter-item correlation test for agreeableness.....	182
Table G.5	Cronbach's α test for conscientiousness.....	182
Table G.6	Inter-item correlation test for conscientiousness.....	182

Table G.7	Cronbach's α test for neuroticism.....	183
Table G.8	Inter-item correlation test for neuroticism.....	183
Table G.9	Cronbach's α test for openness.....	183
Table G.10	Inter-item correlation test for openness.....	183
Table H.2.1	Situational variables: frequencies – Workload	185
Table H.2.2	Situational variables: frequencies – Control	185
Table H.2.3	Situational variables: frequencies – Rewards	185
Table H.2.4	Situational variables: frequencies – Community	186
Table H.2.5	Situational variables: frequencies – Fairness	186
Table H.2.6	Situational variables: frequencies – Values.....	186
Table I.1	Factor analysis situational variables - Total variance explained.....	187
Table L.1	Factor analysis office use - Total variance explained.....	194
Table M.1	Overview input variables MRAs.....	195

Appendix A

Control variables correlated with the BEC

Source	Abbreviation	Source	Abbreviation
Alarcon et al. (2009)	A2009	Maslach et al. (1996)	M1996
Bakker et al. (2013)	B2013	Maslach et al. (2001)	M2001
Bakker et al. (2000)	B2000	Maslach & Leiter (2008)	ML2008
Bakker et al. (2005a)	B2005a	Parker et al. (2010)	P2010
Bakker (2009)	B2009	Peters & Van der Lippe (2007)	PL2007
Christian et al. (2011)	C2011	Schaufeli & Enzmann (1998)	SE1998
Karasek et al. (1981)	K1981	Schaufeli et al. (2009a)	S2009a
Landsbergis (1988)	L1988	Shirom et al. (2005)	S2005
Lee & Ashforth (1996)	LA1996	Semmer (1996)	S1996
Leiter & Maslach (1988)	LM1988	Sonnentag et al. (2012)	S2012
Leiter & Maslach (2004)	LM2004	Ten Brummelhuis & Bakker (2012)	TB2012
Leiter (2005)	L2005	Xanthopoulou et al. (2009a)	X2009a
Leiter et al. (2007)	L2007		

Appendix A.1: Situational control variables correlated with the BEC (burnout)

Situational variables		Burnout			Source
		Exhaustion	Cynicism	Inefficacy	
Workload					
1	Workload/(job) overload	✓			K1981; M2001; ML2008
2	Time pressure	✓			M2001; PL2007; B2013
3	Prolonged exposure to high job demands	✓	✓		B2000
4	High job demands vs. low job resources	✓	✓		B2005a
5	Work performance	✓			B2013
Control					
6	Lack of authority			✓	M2001
7	Lack of participation (e.g. organisational decision-making)	✓			M2001; ML2008
8	Lack of feedback	✓	✓	✓	M2001; B2005a; B2013
9	Role conflict (e.g. conflicting job demands)	✓	✓	✓	LA1996; M2001
10	Role ambiguity (e.g. lack of adequate information)		✓	✓	LA1996; M2001
Reward					
11	Lack of financial rewards			✓	M1996; M2001; X2009a
12	Lack of social rewards (e.g. recognition)			✓	M1996; M2001
13	Lack of intrinsic rewards (e.g. pride)			✓	M1996; M2001
Community					
14	Lack of co-worker support		✓		LM1988; ML2008
15	Lack of supervisor support	✓			LM1988; ML2008
16	Psychological- / health problems (e.g. headaches, muscle tension, sleep disorders)	✓	✓		SE1998; S2005
Fairness					
17	Lack of fairness	✓	✓		M2001; LM2004; ML2008
18	Inequity (e.g. workload, rewards, cheating, promotions)	✓	✓		ML2001
Values					
19	Conflict in values	✓	✓	✓	ML2008
20	Absence duration (not frequency)	✓	✓	✓	S2009a

Appendix A.2: Situational control variables correlated with the BEC (engagement)

Situational variables		Engagement			Source
		Energy	Involvement	Efficacy	
Workload					Source
1	Sustainable workload	✓			L1988; M2001; ML2008
2	Task variety	✓			M2001; C2011; B2013
3	Task significance			✓	M2001; C2011; B2013
Control					
4	Control over workplace dangers	✓	✓	✓	L2005
5	Sufficient authority			✓	M2001
6	Active participation (e.g. organisation decision-making)			✓	M2001; ML2008
7	Sufficient feedback	✓	✓	✓	M2001; B2005a; B2013
8	Proactive behaviour	✓			P2010
9	Actively pursue feedback or support			✓	B2009
10	Work performance	✓	✓	✓	B2013
Reward					
11	Sufficient financial rewards			✓	M1996; M2001; X2009a
12	Sufficient social rewards			✓	M1996; M2001
13	Sufficient intrinsic rewards			✓	M1996; M2001
Community					
14	Social support (co-workers)	✓		✓	LM1988; ML2008
15	Social support (supervisors)			✓	LM1988; ML2008
16	Creativeness	✓	✓	✓	B2005a
17	Transmitting engagement to colleagues		✓		B2009
Fairness					
18	Perceived fairness (e.g. supervisors or organisation)	✓	✓		M2001; LM2004; ML2008
19	Physical detachment (e.g. relaxation, leisure-time activities)	✓	✓	✓	S2012; TB2012
Values					
20	Consistent organisational/personal values on knowledge sharing			✓	L2007; ML2008

Appendix A.3: Individual control variables correlated with the BEC

Individual control variables		Burnout			Engagement			Source
		Exhaustion	Cynicism	Inefficacy	Energy	Involvement	Efficacy	
Socio-demographic								Source
1	Age (e.g. younger employees greater prone to burnout)	✓	✓	✓				M2001
2	Age (work experience)							M2001
3	Gender (males)		✓				✓	M2001
4	Gender (females)	✓						M2001
5	Marital stat. (unmarried>married)	✓	✓	✓				M2001
6	Marital stat. (singles>divorced)	✓	✓	✓				M2001
7	Education (higher>lower)	✓						M2001
Personality								
8	Hardiness (low)	✓						SE1998; M2001 B2013
9	Hardiness (high)						✓	SE1998; M2001 B2013
10	Locus of control (external)					✓	✓	S1996; M2001; A2009
11	Locus of control (internal)		✓	✓				S1996; M2001; A2009
12	Active - confronting coping style						✓	S1996; M2001
13	Passive - defensive coping style			✓				S1996; M2001
14	Type A behaviour	✓						SE1998; M2001
15	Self-esteem (low)	✓	✓	✓				SE1998; M2001
16	Self-esteem (high)				✓	✓	✓	SE1998; M2001
Work-related attitudes								
17	Expectations (low)				✓	✓		M2001
18	Expectations (high)	✓	✓					M2001

Appendix B

Physical workplace characteristics

Appendix B.1: Physical workplace characteristics

# Activity Based Office characteristics ↓		References ↓	Evans & Johnson (2000)	Vos & van der Voordt (2001)	Brill et al. (2001)	Roelofsens (2002)	Heerwagen et al. (2004)	van der Voordt (2004)	De Croon et al. (2005)	Haynes (2007, 2008)	Vischer (2007, 2008a, 2008b)
Activities				✓	✓	✓		✓			✓
Office Layout	1	Variety of workspaces (e.g. office types)			✓			✓	✓	✓	
	2	Availability of workspaces (e.g. # workspaces)						✓	✓	✓	
	3	Proximity of workspaces			✓					✓	
	4	Overhearing (distance)									
	5	Facilities (e.g. printers, storage)	✓	✓		✓		✓	✓		✓
Office Comfort	6	Ambient factors (e.g. heating, ventilation)			✓	✓				✓	✓
	7	Ergonomics (e.g. office furniture)	✓		✓	✓		✓	✓		✓
	8	Noise (e.g. sound level)	✓		✓	✓				✓	✓
	9	Privacy (e.g. auditory, visual)				✓				✓	✓
		Overall comfort	✓		✓	✓				✓	✓
ICT	10	ICT-services (e.g. mobile tools)		✓				✓	✓		
	11	Overall communication					✓		✓		
Office Use	12	Desk-sharing (e.g. claiming behaviour)						✓	✓		
	13	Desk-switching (e.g. switching behaviour)						✓			
	14	Overall interaction (e.g. social-/work related)	✓		✓		✓			✓	✓
	15	Overall distraction (e.g. interruptions, crowding)	✓		✓					✓	✓
Office Location	16	Telework (home)							✓		
	17	Geopresence (third places)							✓		

	#	References ↓															
Activities			✓	✓			✓	✓	✓		✓	✓	✓			✓	
Office Layout	1			✓					✓			✓	✓	✓		✓	
	2			✓					✓			✓	✓				
	3					✓									✓		
	4							✓							✓	✓	
	5							✓	✓			✓				✓	
Office Comfort	6		✓	✓	✓	✓		✓	✓	✓				✓		✓	
	7				✓			✓	✓					✓		✓	
	8		✓		✓				✓	✓				✓		✓	
	9		✓		✓			✓	✓		✓			✓	✓	✓	
				✓	✓	✓		✓	✓	✓	✓						
ICT	10							✓	✓		✓						
	11								✓		✓					✓	
Office Use	12							✓	✓			✓					
	13						✓	✓									
	14							✓	✓		✓				✓	✓	
	15								✓	✓	✓			✓		✓	
Office Location	16	✓							✓		✓		✓				
	17																

Appendix C

Questionnaire – English version

1. What is your job rank within the organisation?

- ☐ Intern / trainee
- ☐ Administrator
- ☐ Regular employee
- ☐ Manager
- ☐ Board member
- ☐ Other, namely:

2. Which (contractual)situation applies to you?

- ☐ Permanent contract (indefinite contract)
- ☐ Temporary contract

3. What is the average amount of hours you work per week?

.....

4. What is the average amount of hours you work at the office per week?

.....

5. How many years of deployment have you fulfilled at your current employer?

.....

Please fill in '0' if you have not completed one year yet

6. How many employers (including your current employer) have you worked for?

.....

7. With what expectation pattern (i.e. nature of work, likelihood of achieving success) did you start your current job?

- ☐ Very low expectations
- ☐ Low expectations
- ☐ Neutral expectations
- ☐ High expectations
- ☐ Very high expectations

8. Did this expectation pattern come true?

- ☐ Yes
- ☐ No

9. Would you please indicate the extent to which you consider these activities important?

	Not important	Slightly important	Neutral	Important	Very important
Concentration work (e.g. individual focused work, reading, (creative) thinking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Informal interactions (e.g. informal meetings, relaxing, taking a break)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formal interactions (e.g. planned meetings, collaborating)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Would you please indicate the extent to which you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I see myself as someone who is reserved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who is generally trusting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who tends to be lazy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who is relaxed, handles stress well	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who has few artistic interests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who is outgoing, sociable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who tends to find fault with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who does a thorough job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who gets nervous easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as someone who has an active imagination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Would you please indicate the extent to which you agree or disagree with the following statements regarding your job?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I have too much work to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can decide myself about the way I perform my job (tasks and duties)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I perceive my authority to be sufficient to pursue the work in a way that I believe is the most effective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to actively participate in organisational decision-making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I perceive my financial rewards as being sufficient for the work I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I perceive my social rewards (e.g. appreciation, respect) as being sufficient for the work I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am proud of the work I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The overall quality of social interaction with co-workers allows me to work as a team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I perceive the relationship with my supervisor as being respectful, close and of mutual support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The balance between the input (e.g. time, effort, and expertise) and output (e.g. rewards and recognition) is fair and equally distributed between me and my colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel like I have to make a trade-off between the work I want to do and the work I have to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Would you please indicate how often each statement of engagement applies to you?

	Never	Sporadic	Occasionally	Regularly	Often	Very often	Always
I feel emotionally drained from my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am questioning the meaning and purpose of the work that I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working all day is really a strain for me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I deal very effectively with the problems at my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel burned out from my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel I am positively influencing the functioning of the organisation through my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have developed a distant attitude towards my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not as enthusiastic as I used to be about my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think I am very good at the work I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel exhilarated after finishing a task at my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel used up at the end of the workday	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have accomplished many worthwhile things in this job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel fatigued when I get up in the morning and have to face another day on the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have become cynical towards the effects of my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very confident about my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Would you please indicate the extent to which you agree or disagree with the following statements about the office you work at?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The variety of workspaces allows me to choose the workspace that best fits the activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can always find a suitable workspace when I work at the office	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, I perceive the office environment as open and transparent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can move around the office environment without disrupting my colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my opinion, the spatial design of the office environment is optimal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, workspaces (e.g. individual-, flex-, combi-space) are located next to each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get easily distracted by overhearing colleagues in close proximity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At my work, workspaces are supported by sufficient facilities (e.g. printers, beverage machines, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Would you please indicate the extent to which you consider the following aspects as comfortable?

	Very uncomfortable	Uncomfortable	Neutral	Comfortable	Very comfortable
Temperature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ventilation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lighting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Air quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal control over the aforementioned ambient factors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ergonomic office chairs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adjustable office desks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall ergonomic furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall comfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. The Activity Based Working concept is based on a set of rules. Would you please indicate how often each statement applies to you?

	Never	Sometimes	About half the time	Often	Always
I can use Cloud computing (rather than file cabinets) to store my data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can use mobile tools (e.g. mobile cell phones/tablets) to arrange my emails	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can use (i.e.) Intranet to work at any given location within the office	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I choose the workspace that fits the activity best	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I clear out the workspace if I am away for more than 15 minutes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After finishing my task, I leave the workspace back to its original and clean set-up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I claim workspaces by personalising them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During work, I interact with colleagues on a social level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During work, I have work-related conversations with colleagues at and around the workspace	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During work, I am easily distracted by colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During work, I'd prefer working alone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At work, I experience excessive noise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If needed, I can isolate myself from colleagues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can work at home at any given time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can work in between home and work (e.g. cafe, campus) at any given time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. What is your gender?

- ☐ Male
- ☐ Female

17. What is your year of birth?

.....

18. What is your highest degree of education?

- ☐ Primary education (i.e. elementary school)
- ☐ Secondary education (i.e. high school)
- ☐ Vocational education
- ☐ Undergraduate (University Bachelor level)
- ☐ Postgraduate (University Master level or PhD)

19. What is your household composition?

- ☐ Living together/married without (resident) children
- ☐ Living together/married with (resident) children
- ☐ Single without (resident) children
- ☐ Single with (resident) children
- ☐ Other, namely:

Questionnaire – Dutch version

1. Wat is uw functie binnen het bedrijf?

- ☐ Stagiair(e)
- ☐ Beheerder
- ☐ Werknemer
- ☐ Manager / Leidinggevende
- ☐ Bestuurslid
- ☐ Anders, namelijk:

2. Welke (contract)situatie is op u van toepassing?

- ☐ Contract voor onbepaalde tijd
- ☐ Tijdelijk contract

3. Hoeveel uur werkt u gemiddeld per week?

.....

4. Hoeveel uur werkt u gemiddeld op kantoor per week?

.....

5. Hoeveel jaar bent u werkzaam bij uw huidige werkgever?

.....

Vul '0' in als u nog geen jaar heeft voltooid

6. Voor hoeveel werkgevers (inclusief uw huidige werkgever) heeft u in totaal gewerkt?

.....

7. Met welk verwachtingspatroon (o.a. aard van het werk, kans op het bereiken van succes) bent u aan uw huidige baan begonnen?

- ☐ Heel lage verwachtingen
- ☐ Lage verwachtingen
- ☐ Neutrale verwachtingen
- ☐ Hoge verwachtingen
- ☐ Heel hoge verwachtingen

8. Is dit verwachtingspatroon uitgekomen?

- ☐ Ja
- ☐ Nee

9. Kunt u aangeven in hoeverre u onderstaande activiteiten belangrijk vindt?

	Niet belangrijk	Enigszins belangrijk	Neutraal	Belangrijk	Heel belangrijk
Concentratiewerk (bijv. individueel gericht werk, lezen, (creatief) denken)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Informele interacties (bijv. informele ontmoetingen, ontspanning, pauze)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formele interacties (bijv. geplande vergaderingen, samenwerken)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Kunt u aangeven in hoeverre u het eens of oneens bent met de volgende stellingen?

	Helemaal mee oneens	Oneens	Neutraal	Eens	Helemaal mee eens
Ik zie mezelf als iemand die terughoudend is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die over het algemeen vertrouwend is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die geneigd is om lui te zijn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die ontspannen is en goed om kan gaan met stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die weinig artistieke interesses heeft	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die extravert en sociaal is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die geneigd is fouten bij anderen te zoeken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die grondig te werk gaat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die gemakkelijk nerveus raakt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zie mezelf als iemand die een actieve verbeeldingskracht heeft	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Kunt u aangeven in hoeverre u het eens of oneens bent met de volgende stellingen omtrent uw werk?

	Helemaal mee oneens	Oneens	Neutraal	Eens	Helemaal mee eens
Ik heb te veel werk te doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan zelf bepalen hoe ik mijn functie (taken en plichten) invul	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik acht mijn autoriteit voldoende om het werk te verzetten op een manier die volgens mij het meest effectief is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben in staat om actief deel te nemen aan de besluitvorming van de organisatie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik beschouw mijn financiële beloningen als voldoende voor het werk dat ik doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik beschouw mijn sociale beloningen (bijv. waardering, respect) als voldoende voor het werk dat ik doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben trots op het werk dat ik doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De kwaliteit van sociale interacties met collega's stelt mij in staat om te werken als een team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik beschouw de relatie met mijn leidinggevende als respectvol, hecht en van wederzijdse steun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De balans tussen de invoer (bijv. tijdsbesteding en expertise) en uitvoer (bijv. beloningen en erkenning) is eerlijk en gelijk verdeeld tussen mij en mijn collega's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik heb het gevoel dat ik een afweging moet maken tussen het werk dat ik wil doen en het werk dat ik moet doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Kunt u aangeven hoe vaak elke stelling omtrent betrokkenheid op u van toepassing is?

	Nooit	Sporadisch	Af en toe	Regelmatig	Vaak	Heel vaak	Altijd
Ik voel me mentaal uitgeput door mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik twijfel aan het nut van mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Een hele dag werken vormt een zware belasting voor mij	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik weet de problemen in mijn werk goed op te lossen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik voel me 'opgebrand' door mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik heb het gevoel dat ik met mijn werk een positieve bijdrage lever aan het functioneren van de organisatie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik merk dat ik teveel afstand heb gekregen van mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben niet meer zo enthousiast als vroeger over mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik vind dat ik mijn werk goed doe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Als ik op mijn werk iets afrond vrolijkt dat me op	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aan het eind van mijn werkdag voel ik me leeg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik heb in deze baan veel waardevolle dingen bereikt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik voel me vermoeid als ik 's morgens op sta en er weer een werkdag voor me ligt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben cynischer geworden over de effecten van mijn werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Op mijn werk blaak ik van zelfvertrouwen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Kunt u aangeven in hoeverre u het eens of oneens bent met de volgende stellingen aangaande het kantoor waar u werkt?

	Helemaal mee oneens	Oneens	Neutraal	Eens	Helemaal mee eens
Door de verscheidenheid aan werkruimten kan ik de werkruimte kiezen die het best bij de activiteit past	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan altijd een geschikte werkplek vinden als ik op kantoor werk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over het algemeen zie ik de kantooromgeving als open en transparant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan me verplaatsen in de kantooromgeving zonder mijn collega's te storen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Naar mijn mening is het ruimtelijk ontwerp van de kantooromgeving optimaal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In het algemeen bevinden werkruimten (bijv. individuele-, flex-, combi-ruimten) zich naast elkaar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik word snel afgeleid door verbale communicatie van collega's in mijn directe omgeving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Op mijn werk worden werkruimten ondersteund door voldoende faciliteiten (bijv. printers, drankmachines, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Kunt u aangeven in hoeverre u de volgende aspecten als comfortabel beschouwd?

	Heel oncomfortabel	Oncomfortabel	Neutraal	Comfortabel	Heel comfortabel
Temperatuur	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verwarming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ventilatie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verlichting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Luchtkwaliteit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Persoonlijke controle over bovengenoemde omgevingsfactoren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ergonomische bureaustoelen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verstelbare bureaus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Algeheel ergonomisch meubilair	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Algeheel comfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. Het Activity Based Working concept is gebaseerd op een aantal regels. Kunt u aangeven hoe vaak de volgende stellingen op u van toepassing zijn?

	Nooit	Soms	Ongeveer de helft van de tijd	Vaak	Altijd
Ik kan Cloud computing (in plaats van archiefkasten) gebruiken om mijn gegevens op te slaan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan mobiele hulpmiddelen (bijv. mobiele telefoons, tablets) gebruiken om mijn e-mails te ordenen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan (bijv.) Intranet gebruiken om op elke willekeurige locatie in het kantoor te werken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kies de werkruimte die het best bij de activiteit past	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ruim de werkruimte op als ik meer dan 15 minuten afwezig ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Na het beëindigen van mijn taak, herstel ik de werkruimte in zijn oorspronkelijke staat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik claim werkruimten door deze te personaliseren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tijdens het werk heb ik interactie met collega's op sociaal niveau	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tijdens het werk heb ik werk-gerelateerde gesprekken met collega's in en rond de werkruimten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tijdens het werk word ik snel afgeleid door collega's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tijdens het werk zou ik het liefst alleen werken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Op het werk ervaar ik veel lawaai	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Indien nodig kan ik mezelf isoleren van collega's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan op ieder gewenst moment thuis werken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan op ieder gewenst moment buiten het kantoor werken (bijv. cafés, campussen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Wat is uw geslacht?

- ☐ Man
- ☐ Vrouw

17. Wat is uw geboortjaar?

.....

18. Wat is uw hoogst behaalde opleiding?

- ☐ Primair onderwijs (basisschool, lagere school)
- ☐ Voortgezet onderwijs (mavo, havo, vwo)
- ☐ Beroepsonderwijs (mbo, mts)
- ☐ Hoger beroepsonderwijs (hbo, hts, heao, Universiteit bachelor)
- ☐ Wetenschappelijk onderwijs (Universiteit Master, gepromoveerd)

19. Wat is uw huishoudsamenstelling?

- ☐ Samenwonend/getrouwd zonder (inwonende) kinderen
- ☐ Samenwonend/getrouwd met inwonend(e) kind(eren)
- ☐ Alleenstaand zonder (inwonende) kinderen
- ☐ Alleenstaand met inwonend(e) kind(eren)
- ☐ Anders, namelijk:

Appendix D

UBOS-GS (Dutch)

		Nooit	Sporadisch	Af en toe	Regelmatig	Dikwijls	Zeer dikwijls	Altijd
		1	2	3	4	5	6	7
		Nooit	Een paar keer per jaar of minder	Eens per maand of minder	Een paar keer per maand	Eens per week	Een paar keer per week	Dagelijks
Ubos01	1	Ik voel me mentaal uitgeput door mijn werk					U	1 2 3 4 5 6 7
Ubos02	2	Ik twijfel aan het nut van mijn werk					D	1 2 3 4 5 6 7
Ubos03	3	Een hele dag werken vormt een zware belasting voor mij					U	1 2 3 4 5 6 7
Ubos04	4	Ik weet de problemen in mijn werk goed op te lossen					C	1 2 3 4 5 6 7
Ubos05	5	Ik voel me 'opgebrand' door mijn werk					U	1 2 3 4 5 6 7
Ubos06	6	Ik heb het gevoel dat ik met mijn werk een positieve bijdrage lever aan het functioneren van de organisatie					D	1 2 3 4 5 6 7
Ubos07	7	Ik merk dat ik teveel afstand heb gekregen van mijn werk					D	1 2 3 4 5 6 7
Ubos08	8	Ik ben niet meer zo enthousiast als vroeger over mijn werk					D	1 2 3 4 5 6 7
Ubos09	9	Ik vind dat ik mijn werk goed doe					C	1 2 3 4 5 6 7
Ubos10	10	Als ik op mijn werk iets afrond vrolijk dat me op					C	1 2 3 4 5 6 7
Ubos11	11	Aan het einde van een werkdag voel ik me leeg					U	1 2 3 4 5 6 7
Ubos12	12	Ik heb in deze baan veel waardevolle dingen bereikt					C	1 2 3 4 5 6 7
Ubos13	13	Ik voel me vermoeid als ik 's morgens opsta en er weer een werkdag voor me ligt					U	1 2 3 4 5 6 7
Ubos14	14	Ik ben cynischer geworden over de effecten van mijn werk					D	1 2 3 4 5 6 7
Ubos15	15	Op mijn werk blaak ik van zelfvertrouwen					C	1 2 3 4 5 6 7

U = uitputting, D = distantie, C = competentie

UBOS-GS (English)

			Never 1	Sporadic 2	Occasionally 3	Regularly 4	Often 5	Very often 6	Always 7
			Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Daily
Ubos01	1	I feel emotionally drained from my work						EX	1 2 3 4 5 6 7
Ubos02	2	I am questioning the meaning and purpose of the work that I do						CY	1 2 3 4 5 6 7
Ubos03	3	Working all day is really a strain for me						EX	1 2 3 4 5 6 7
Ubos04	4	I deal very effectively with the problems at my work						EF	1 2 3 4 5 6 7
Ubos05	5	I feel burned out from my work						EX	1 2 3 4 5 6 7
Ubos06	6	I feel I am positively influencing the functioning of the organisation through my work						CY	1 2 3 4 5 6 7
Ubos07	7	I have developed a distant attitude towards my work						CY	1 2 3 4 5 6 7
Ubos08	8	I am not as enthusiastic as I used to be about my work						CY	1 2 3 4 5 6 7
Ubos09	9	I think I am very good at the work I do						EF	1 2 3 4 5 6 7
Ubos10	10	I feel exhilarated after finishing a task at my work						EF	1 2 3 4 5 6 7
Ubos11	11	I feel used up at the end of the workday						EX	1 2 3 4 5 6 7
Ubos12	12	I have accomplished many worthwhile things in this job						EF	1 2 3 4 5 6 7
Ubos13	13	I feel fatigued when I get up in the morning and have to face another day on the job						EX	1 2 3 4 5 6 7
Ubos14	14	I have become cynical towards the effects of my work						CY	1 2 3 4 5 6 7
Ubos15	15	I am very confident about my work						EF	1 2 3 4 5 6 7

EX = exhaustion, CY = cynicism, EF = efficiency

Appendix E

Codebook

Table E.1: Codebook

Number	Name	Label	Value	Remark
1	id	id		
2	Job rank	Org_Job_rank	1 = Intern / trainee	Recoded
3	Job rank	Rec_Job_rank	2 = Administrator 3 = Regular employee 4 = Manager 5 = Board member 6 = Other	
4	Job rank other	Job_rank_other	D.N.A.	
5	Contract	Contract_nature	1 = Permanent contract 2 = Temporary contract	
6	Contract	Contract_workhours	D.N.A.	Recoded
7	Contract	Org_Contract_telework_workhours_at_office	D.N.A.	
8	Contract	Rec_Contract_telework_workhours	D.N.A.	
9	Work exp	Work_experience_employment	D.N.A.	
10	Work exp	Work_experience_employers	D.N.A.	
11	Org Exp	Org_Expectations	1 = Very low expectations 2 = Low expectations 3 = Average expectations 4 = High expectations 5 = Very high expectations	Recoded
12	Rec Exp High Low	Rec_Expectations_high_low	1 = Low 2 = High	
13	Expectations	Expectations_result	1 = Yes 2 = No	
14	Expectation Pattern	Expectations_pattern	1 = D.N.A 2 = Low/Yes 3 = Low/No & High/Yes 4 = High/No (Potential)	
15	Expectations Potentials	Expectations_potentials	1 = Yes 2 = No	
16	Activities 1	Activities_concentration	1 = Not important	
17	Activities 2	Activities_informal	2 = Slightly important	
18	Activities 3	Activities_formal	3 = Neutral 4 = Important 5 = Very important	
19	Personality 1	Org_Personality_extra_reserved	1 = Strongly disagree	Recoded
20	Personality 1	Rec_Personality_extra_reserved	2 = Disagree	
21	Personality 2	Personality_agree_trustubg	3 = Neutral	Recoded
22	Personality 3	Org_Personality_cons_lazy	4 = Agree	
23	Personality 3	Rec_Personality_cons_lazy	5 = Strongly agree	Recoded
24	Personality 4	Org_Personality_neuro_relaxed		
25	Personality 4	Rec_Personality_neuro_relaxed		Recoded
26	Personality 5	Org_Personality_open_few_artistic_interest		
27	Personality 5	Rec_Personality_open_few_artistic_interest		Recoded
28	Personality 6	Personality_extra_sociable		
29	Personality 7	Org_Personality_agree_fault_with_others		Recoded
30	Personality 7	Rec_Personality_agree_fault_with_others		
31	Personality 8	Personality_cons_thorough_job		
32	Personality 9	Personality_neuro_nervous		
33	Personality 10	Personality_open_active_imagination		
34	Form Pers Extra	Form_Personality_Extraversion	D.N.A.	
35	Form Pers Agree	Form_Personality_Agreeableness	D.N.A.	

36	Form Pers Cons	Form_Personality_Conscientiousness	D.N.A.	
37	Form Pers Neuro	Form_Personality_Neuroticism	D.N.A.	
38	Form Pers Open	Form_Personality_Openness	D.N.A.	
39	Sum Pers Extra	Sum_Pers_Extraversion	D.N.A.	
40	Sum Pers Agree	Sum_Pers_Agreeableness	D.N.A.	
41	Sum Pers Cons	Sum_Pers_Conscientiousness	D.N.A.	
42	SumPers Neuro	Sum_Pers_Neuroticism	D.N.A.	
43	Sum Pers Open	Sum_Pers_Openness	D.N.A.	
44	Sitvar 1	Org_Sitvar_workload_overload	1 = Strongly disagree	
45	Sitvar 2	Sitvar_control_control	2 = Disagree	
46	Sitvar 3	Sitvar_control_authority	3 = Neutral	
47	Sitvar 4	Sitvar_control_participation	4 = Agree	
48	Sitvar 5	Sitvar_rewards_financial	5 = Strongly agree	
49	Sitvar 6	Sitvar_rewards_social		
50	Sitvar 7	Sitvar_rewards_intrinsic		
51	Sitvar 8	Sitvar_community_support_coworkers		
52	Sitvar 9	Sitvar_community_support_supervisors		
53	Sitvar 10	Sitvar_fairness_input_output		
54	Sitvar 11	Org_Sitvar_values_trade_off		
55	Form Sitvar Rec	Form_Sitvar_recognition	1 = Strongly disagree	
56	Form Sitvar Overl	Form_Sitvar_overload	2 = Disagree	
57	Form Sitvar Cont	Form_Sitvar_control	3 = Neutral	
58	Form Sitvar App	Form_Sitvar_appreciation	4 = Agree	
			5 = Strongly agree	
59	Sitvar Recognition	Sum_Sitvar_recognition	1 = Strongly disagree	
60	Sitvar Overload	Sum_Sitvar_overload	2 = Disagree	
61	Sitvar Control	Sum_Sitvar_control	3 = Neutral	
62	Sitvar Appreciation	Sum_Sitvar_appreciation	4 = Agree	
			5 = Strongly agree	
63	BEC 1	Org_BEC_EX_EN_emotionally_drained	1 = Never	
64	BEC 1	Rec_BEC_EX_EN_emotionally_drained	2 = Sporadic	Recorded
65	BEC 2	Org_BEC_CY_IN_meaning_purpose	3 = Occasionally	
66	BEC 2	Rec_BEC_CY_IN_meaning_purpose	4 = Regularly	Recorded
67	BEC 3	Org_BEC_EX_EN_working_all_day_strain	5 = Often	
68	BEC 3	Rec_BEC_EX_EN_working_all_day_strain	6 = Very often	Recorded
69	BEC 4	BEC_IN_EF_dealing_w_problems_effectively	7 = Always	
70	BEC 5	Org_BEC_EX_EN_burned_out		
71	BEC 5	Rec_BEC_EX_EN_burned_out		Recorded
72	BEC 6	BEC_IN_EF_influencing_work_positively		
73	BEC 7	Org_BEC_CY_IN_distant_attitude		
74	BEC 7	Rec_BEC_CY_IN_distant_attitude		Recorded
75	BEC 8	Org_BEC_CY_IN_enthusiastic		
76	BEC 8	Rec_BEC_CY_IN_enthusiastic		Recorded
77	BEC 9	BEC_IN_EF_good_at_work		
78	BEC 10	BEC_IN_EF_exhilarated		
79	BEC 11	Org_BEC_EX_EN_feeling_used_up		
80	BEC 11	Rec_BEC_EX_EN_feeling_used_up		Recorded
81	BEC 12	BEC_IN_EF_accomplished_worthwhile_things		
82	BEC 13	Org_BEC_EX_EN_fatigued		
83	BEC 13	Rec_BEC_EX_EN_fatigued		Recorded
84	BEC 14	Org_BEC_CY_IN_cynical		
85	BEC 14	Rec_BEC_CY_IN_cynical		Recorded
86	BEC 15	BEC_IN_EF_confident		
87	Form BEC Ind	Form_BEC_individual	1 = Never	
88	Form BEC Inter	Form_BEC_interpersonal	2 = Sporadic	
89	Form BEC Self Eval	Form_BEC_self_evaluation	3 = Occasionally	
90	Sum BEC Ind	Sum_BEC_individual	4 = Regularly	

91	Sum BEC Inter	Sum_BEC_interpersonal	5 = Often	
92	Sum BEC Self Eval	Sum_BEC_self_evaluation	6 = Very often 7 = Always	
93	Office lay 1	Office_layout_variety_best_workplace	1 = Strongly disagree	
94	Office lay 2	Office_layout_availability_suitable_workplace	2 = Disagree	
95	Office lay 3	Office_layout_openness_open_transparant	3 = Neutral	
96	Office lay 4	Office_layout_openness_movement	4 = Agree	
97	Office lay 5	Office_layout_distance_spatial_design	5 = Strongly agree	
98	Office lay 6	Org_Office_layout_distance_workspace_allocation		
99	Office lay 7	Org_Office_layout_distance_distraction		
100	Office lay 8	Office_layout_facilities_support		
101	Form Office Lay	Form_Office_Layout	1 = Strongly disagree	
102	Sum Office lay	Office_layout_supportiveness	2 = Disagree	
103	Other Office lay	Other_Office_Layout_supportiveness	3 = Neutral 4 = Agree 5 = Strongly agree	
104	Office com 1	Office_comfort_temperature	1 = Very uncomfortable	
105	Office com 2	Office_comfort_heating	2 = Uncomfortable	
106	Office com 3	Office_comfort_ventilation	3 = Neutral	
107	Office com 4	Office_comfort_lighting	4 = Comfortable	
108	Office com 5	Office_comfort_air_quality	5 = Very comfortable	
109	Office com 6	Office_comfort_personal_control		
110	Office com 7	Office_comfort_ergonomic_chairs		
111	Office com 8	Office_comfort_adjustable_desks		
112	Office com 9	Office_comfort_overall_ergonomics		
113	Office com 10	Office_comfort_overall_comfort		
114	Form Office com	Form_Office_comfort	1 = Very uncomfortable	
115	Sum Office com	Perceived_Office_comfort	2 = Uncomfortable 3 = Neutral 4 = Comfortable 5 = Very comfortable	
116	IUL 1	IUL_ICT_cloud_computing	1 = Never	
117	IUL 2	IUL_ICT_mobile_tools	2 = sometimes	
118	IUL 3	IUL_ICT_intranet	3 = About half the time	
119	IUL 4	IUL_desk_switching_choose_best_workspace	4 = Often	
120	IUL 5	IUL_desk_switching_clear_out_workspace	5 = Always	
121	IUL 6	IUL_desk_sharing_leave_to_original_set_up		
122	IUL 7	Org_IUL_desk_sharing_claiming_workspace		
123	IUL 8	IUL_interaction_social		
124	IUL 9	IUL_interaction_work_related		
125	IUL 10	Org_IUL_distraction_interruptions		
126	IUL 11	Org_IUL_IUL_distraction_crowding		
127	IUL 12	Org_IUL_noise		
128	IUL 13	IUL_privacy		
129	IUL 14	IUL_telework_home		
130	IUL 15	IUL_telework_between_home_work		
131	Form ICT	Form_ICT	1 = Never	
132	Form Office Use Int	Form_Office_use_interaction	2 = sometimes	
133	Form Office Use Dist	Form_Office_use_distraction	3 = About half the time	
134	Form Office Use Desk Switch	Form_Office_use_desk_switching	4 = Often	
135	Form Office Use Claim	Form_Office_use_claiming	5 = Always	
136	Form Office Location	Form_Office_location		
137	Sum ICT	Accessibility_ICT		
138	Office Use Interaction	Office_use_interaction		
139	Office Use Distraction	Office_use_distraction		
140	Office Use Desk-Switching	Office_use_desk_switching		
141	Office Use Claiming	Office_use_claiming		

142	Sum Office Location	Possibility_telework		
143	Gender	Gender	1 = Male 2 = Female	
144	Male	Male	1 = Male 0 = Female	Dummy
145	Year birth	Year_of_birth	D.N.A.	
146	Date birth	Date_of_birth	D.N.A.	
147	Form date	Form_Date	D.N.A.	
148	Age	Age	D.N.A.	
149	Age Class	Age_Class	D.N.A.	
150	Education	Education	1 = Primary education 2 = Secondary education 3 = Vocational education 4 = Undergraduate (University Bachelor level) 5 = Postgraduate (University Master or PhD)	
151	Education level	Education_level	1 = Low education 2 = Medium education 3 = High education	
152	Hhold comp	Household_composition	1 = Married / living together without children 2 = Married / living together with children 3 = Single without children 4 = Single with children 5 = Other	
153	Hhold comp other	Household_composition_other	D.N.A.	

Appendix F

Chi Square Tests

Table F.1: Chi-Square test for gender

Gender	
Chi-Square	6,787 ^a
df	1
Asymp. Sig.	,009

Table F.2: T-Test for average age

	Test Value = 42.1					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Age	1,776	181	,077	1,547	-,17	3,27

Table F.3: Chi-Square test for education level

Education level	
Chi-Square	130,877 ^a
df	2
Asymp. Sig.	,000

Table F.4: Chi-Square test for household composition

Household composition	
Chi-Square	24,757 ^a
df	4
Asymp. Sig.	,000

Appendix G

Personality: Cronbach's α and inter-item correlation

Table G.1: Cronbach's α test for extraversion

Extraversion	
Cronbach's Alpha	N of Items
,698	2

Table G.2: Inter-item correlation test for extraversion

Extraversion				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Rec_Personality_extra_reserved	3,76	,896	,536	
Personality_extra_sociable	3,70	,945	,536	

Table G.3: Cronbach's α test for agreeableness

Agreeableness	
Cronbach's Alpha	N of Items
,398	2

Table G.4: Inter-item correlation test for agreeableness

Agreeableness				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Personality_agree_trusting	3,92	,622	,259	
Rec_Personality_agree_fault_with_others	4,20	,347	,259	

Table G.5: Cronbach's α test for conscientiousness

Conscientiousness	
Cronbach's Alpha	N of Items
,574	2

Table G.6: Inter-item correlation test for conscientiousness

Conscientiousness				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Rec_Personality_cons_lazy	4,05	,517	,403	
Personality_cons_thorough_job	4,26	,587	,403	

Table G.7: Cronbach's α test for neuroticism

Neuroticism	
Cronbach's Alpha	N of Items
,716	2

Table G.8: Inter-item correlation test for neuroticism

Neuroticism				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
Rec_Personality_neuro_relaxed	2,10	,640	,564	
Personality_neuro_nervous	2,11	,473	,564	

Table G.9: Cronbach's α test for openness

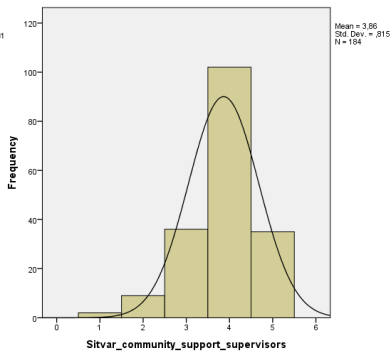
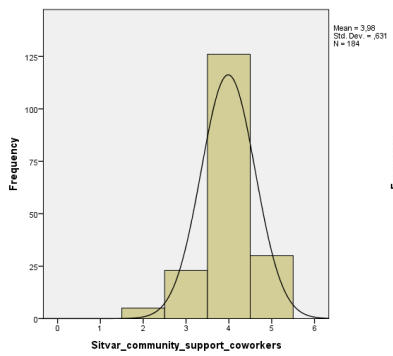
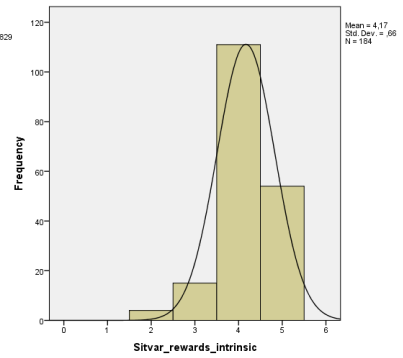
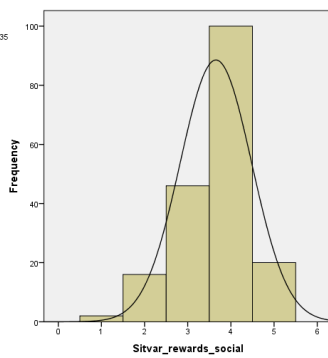
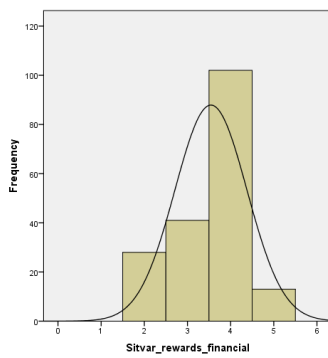
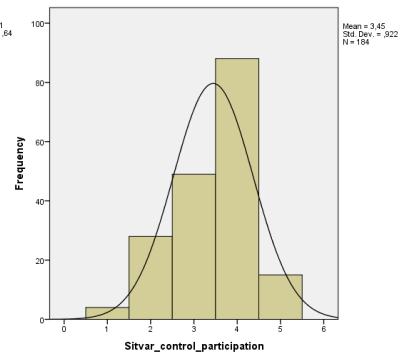
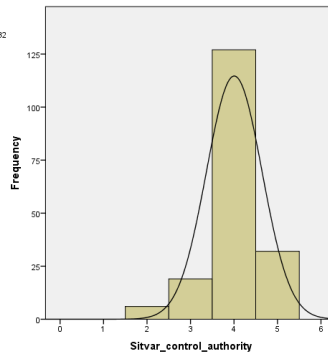
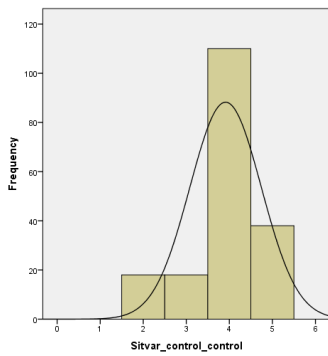
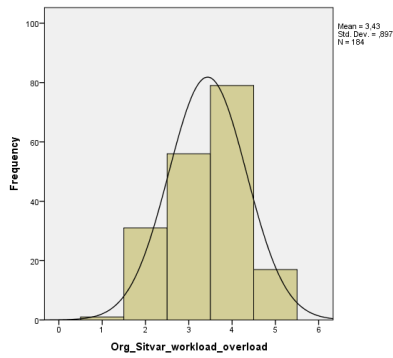
Openness	
Cronbach's Alpha	N of Items
,529	2

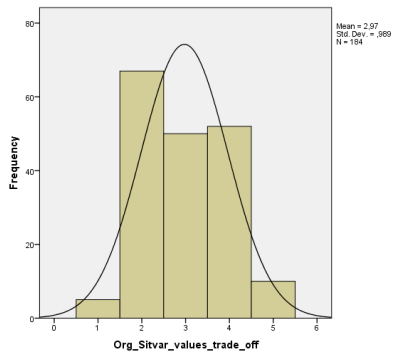
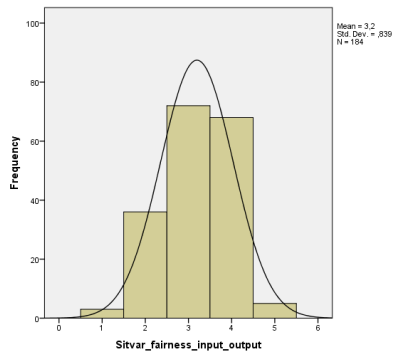
Table G.10: Inter-item correlation test for openness

Openness to experience				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Rec_Personality_open_few_artistic_interests	3,67	,627	,373	
Personality_open_active_imagination	3,16	1,095	,373	

Appendix H

H.1: Situational variables - Distribution





H.2: Situational variables: Frequencies

Workload	Workload	
	N	%
Strongly disagree	1	0,5
Disagree	31	16,8
Neutral	56	30,4
Agree	79	42,9
Strongly agree	17	9,2
Total	184	100,0

Control	Control		Authority		Participation	
	N	%	N	%	N	%
Strongly disagree	0	0,0	0	0,0	4	2,2
Disagree	18	9,8	6	3,3	28	15,2
Neutral	18	9,8	19	10,3	49	26,6
Agree	110	59,8	127	69,0	88	47,8
Strongly agree	38	20,7	32	17,4	15	8,2
Total	184	100	184	100	184	100

Rewards	Financial		Social		Intrinsic	
	N	%	N	%	N	%
Strongly disagree	0	0,0	2	1,1	0	0,0
Disagree	28	15,2	16	8,7	4	2,2
Neutral	41	22,3	46	25,0	15	8,2
Agree	102	55,4	100	54,3	111	60,3
Strongly agree	13	7,1	20	10,9	54	29,3
Total	184	100	184	100	184	100

Community	Co-worker support		Supervisor support	
	N	%	N	%
Strongly disagree	0	0,0	2	1,1
Disagree	5	2,7	9	4,9
Neutral	23	12,5	36	19,6
Agree	126	68,5	102	55,4
Strongly agree	30	16,3	35	19,0
Total	184	100	184	100

Fairness	Input-output	
	N	%
Strongly disagree	3	1,6
Disagree	36	19,6
Neutral	72	39,1
Agree	68	37,0
Strongly agree	5	2,7
Total	184	100,0

Values	Trade-off	
	N	%
Strongly disagree	5	2,7
Disagree	67	36,4
Neutral	50	27,2
Agree	52	28,3
Strongly agree	10	5,4
Total	184	100,0

Appendix I

I.1: Situational variables – Total variance explained

Table I.1: Factor analysis situational variables - Total variance explained

Total Variance Explained							
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
Rec_Sitvar_1	2,852	25,924	25,924	2,314	21,034	21,034	1,793
Sitvar_2	1,689	15,356	41,281	1,098	9,980	31,014	1,030
Sitvar_3	1,262	11,476	52,757	,741	6,736	37,750	1,487
Sitvar_4	1,066	9,687	62,444	,401	3,642	41,392	1,336
Sitvar_5	,842	7,656	70,100				
Sitvar_6	,777	7,067	77,167				
Sitvar_7	,687	6,243	83,410				
Sitvar_8	,543	4,936	88,346				
Sitvar_9	,504	4,580	92,926				
Sitvar_10	,426	3,870	96,797				
Rec_Sitvar_11	,352	3,203	100,000				
Extraction Method: Principal Axis Factoring.							

I.2: Situational variables – Screeplot

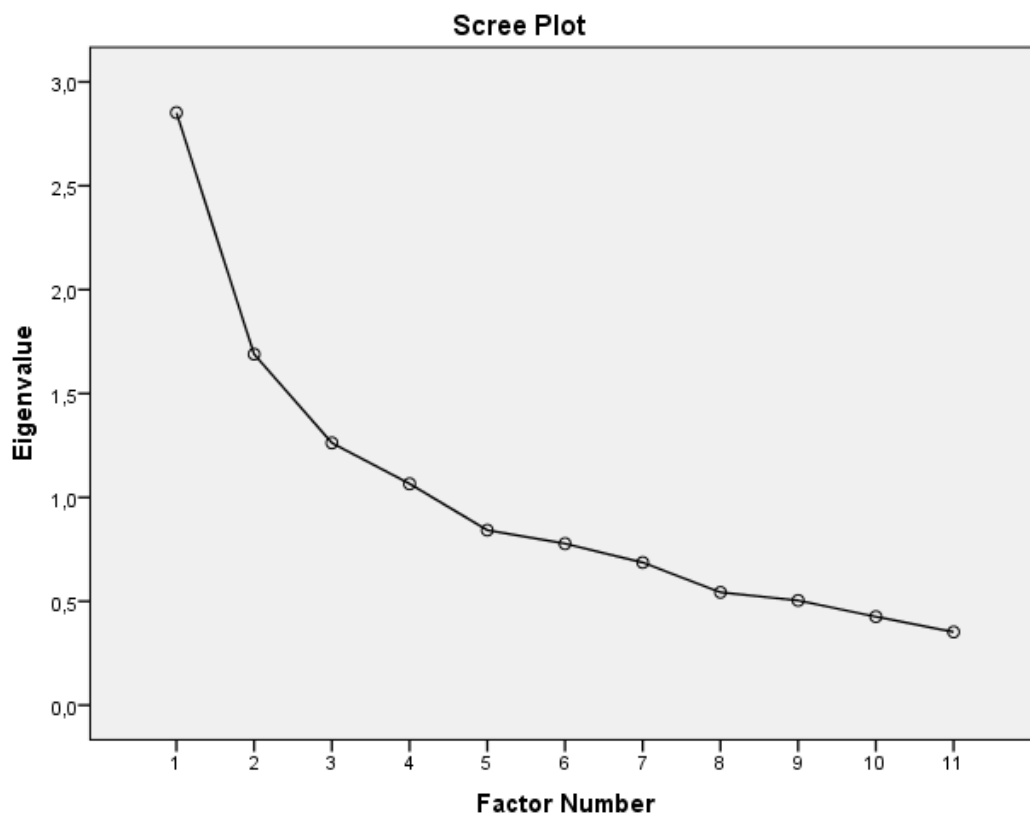
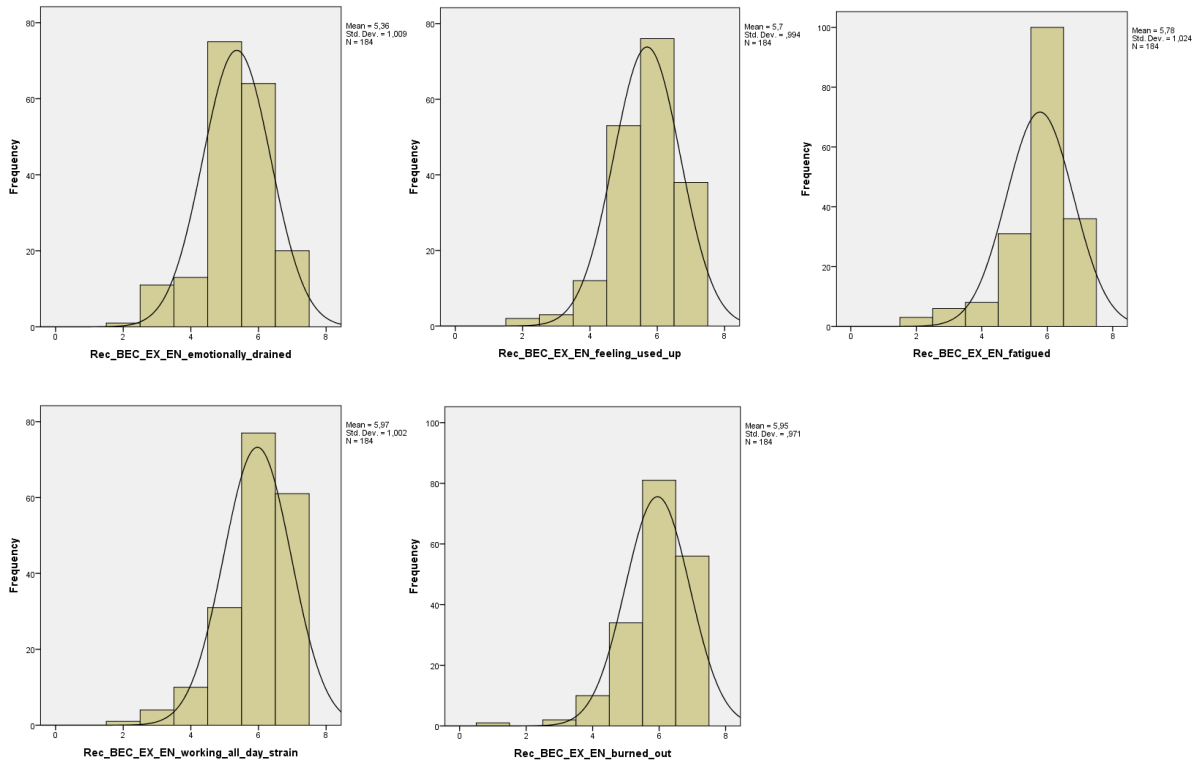


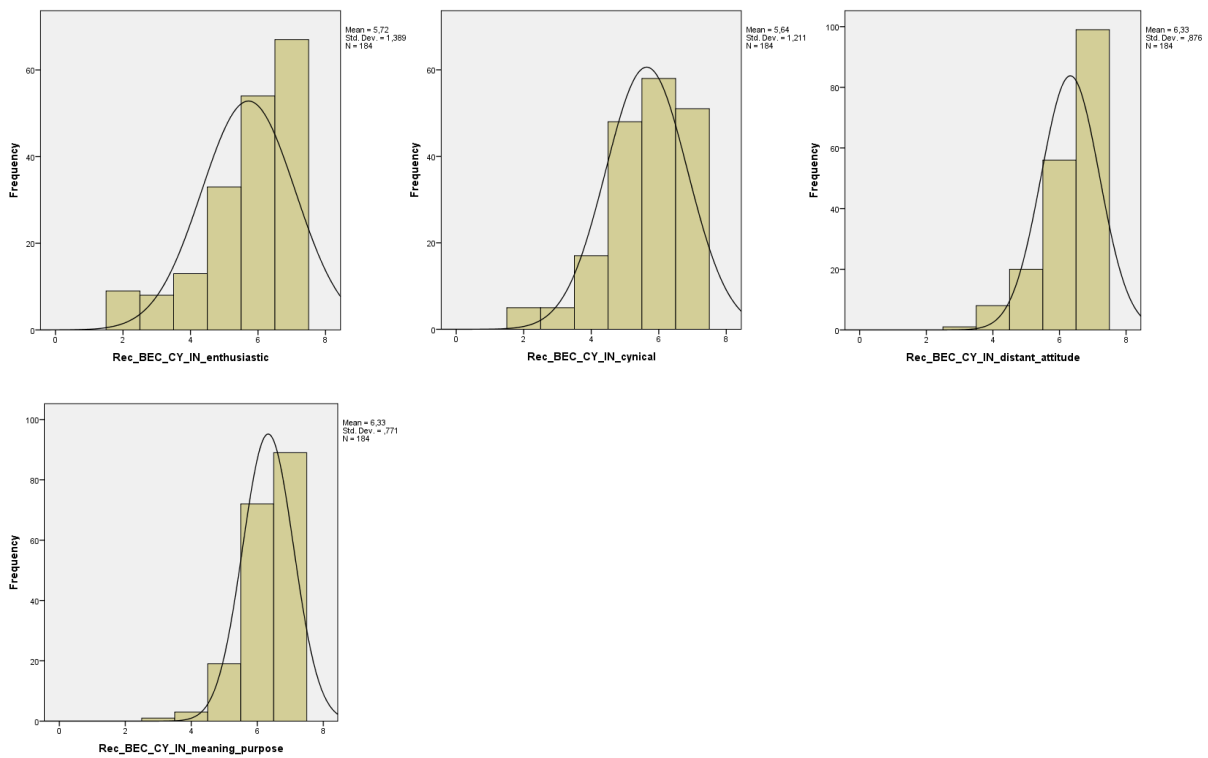
Figure I.2: Factor analysis situational variables - Screeplot

Appendix J

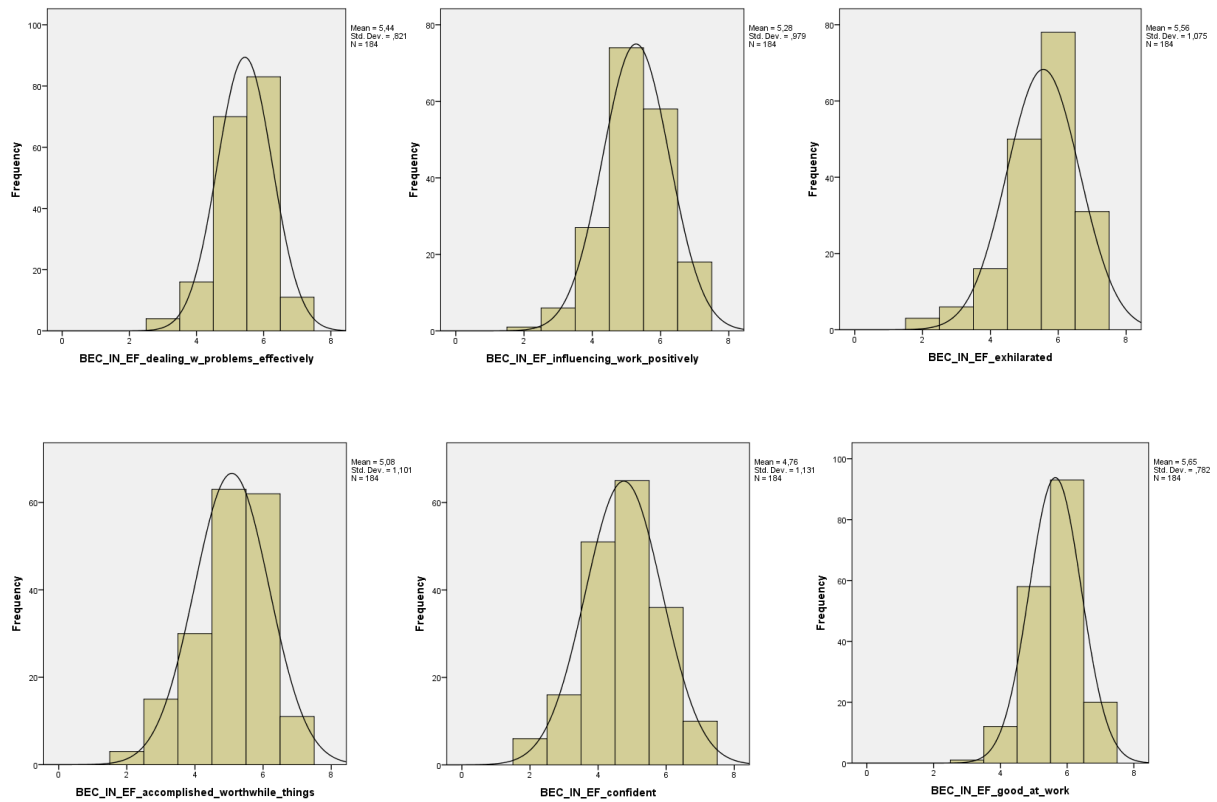
J.1: BEC – Dim. 1: Exhaustion – Energy



J.2: BEC – Dim. 2: Cynicism – Involvement

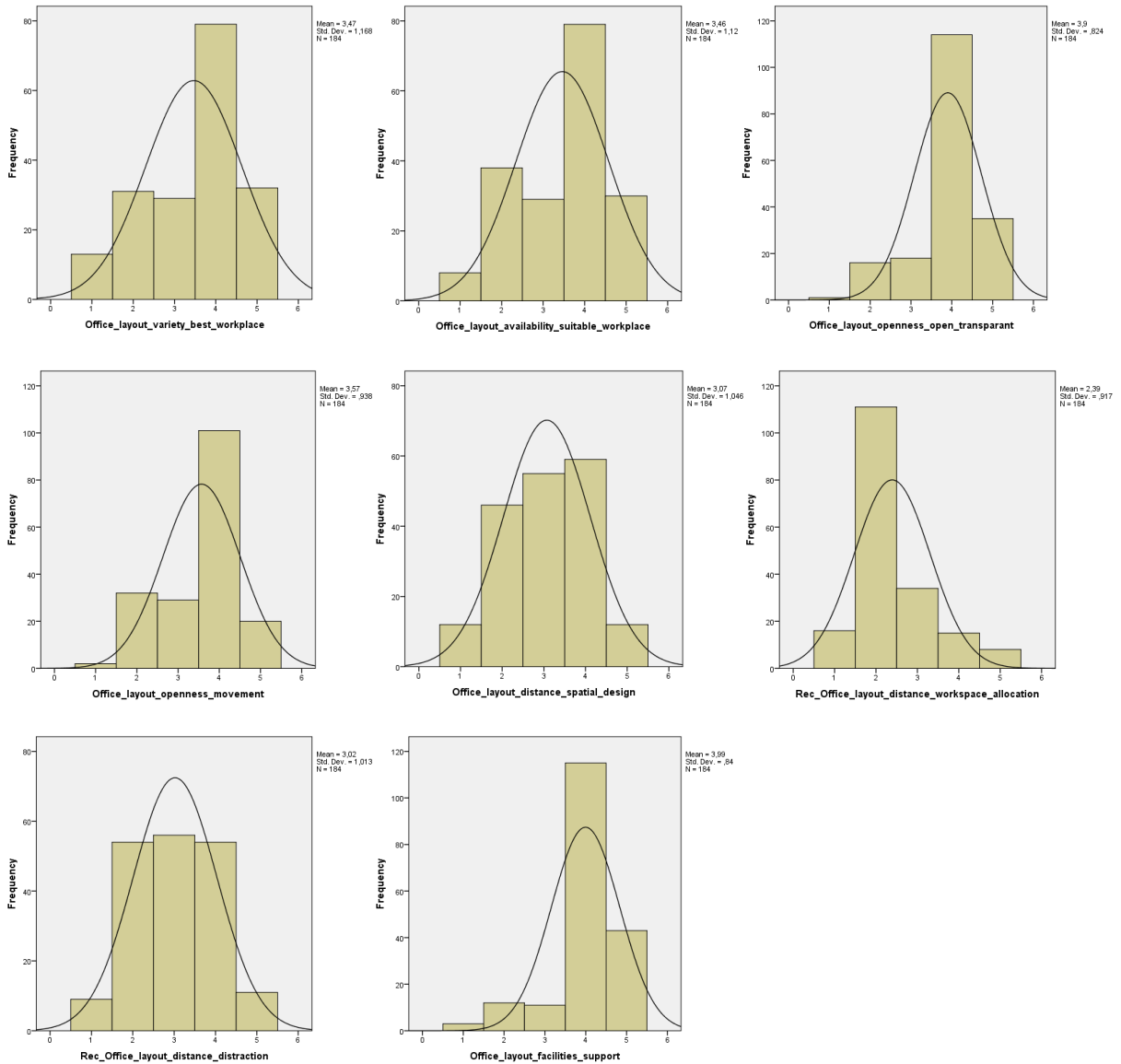


J.3: BEC – Dim. 3: Inefficacy – Efficacy

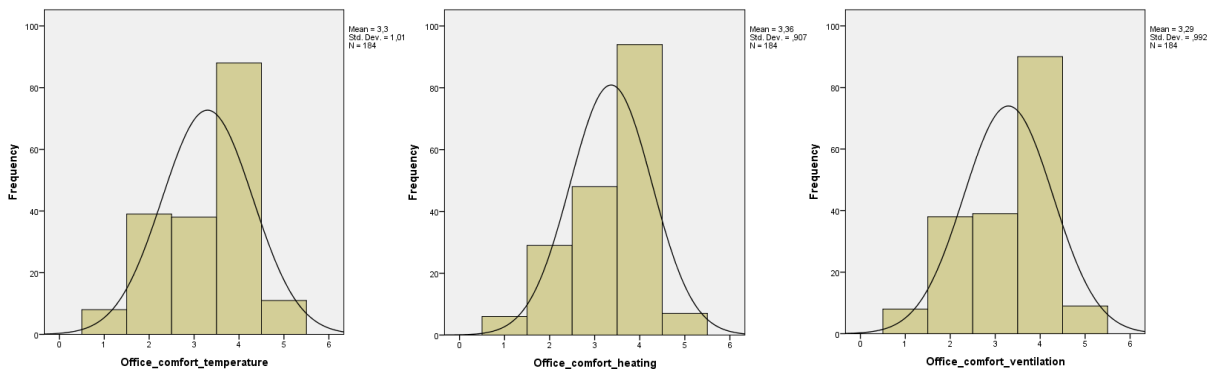


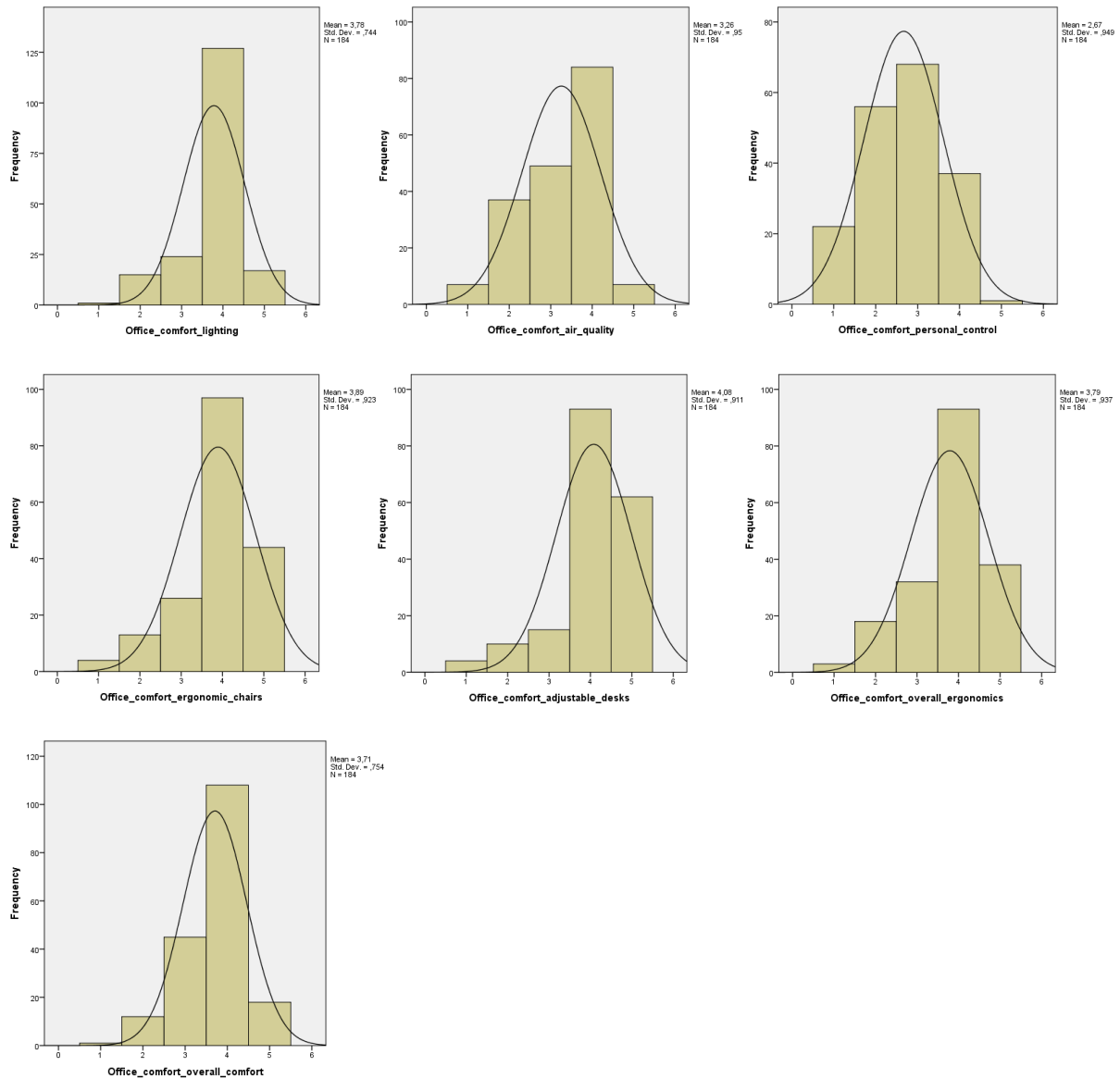
Appendix K

K.1: Office layout supportiveness - Distribution

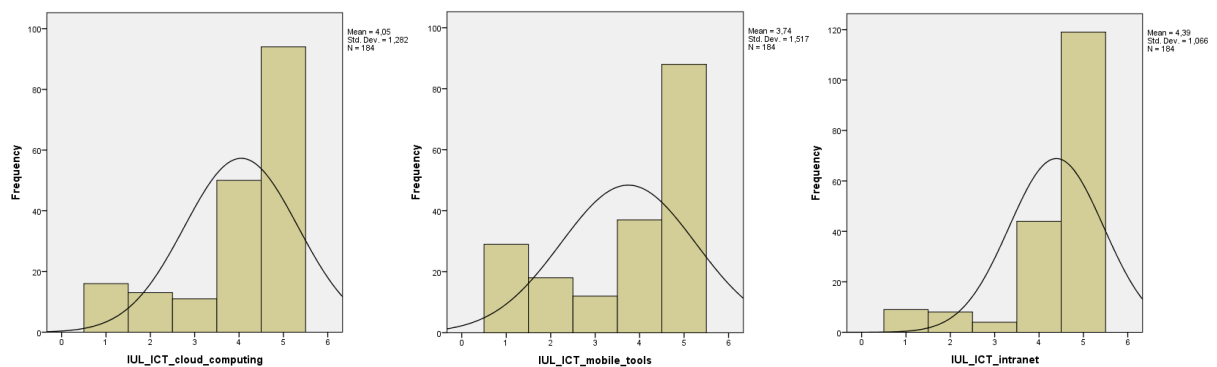


K.2: Perceived office comfort - Distribution

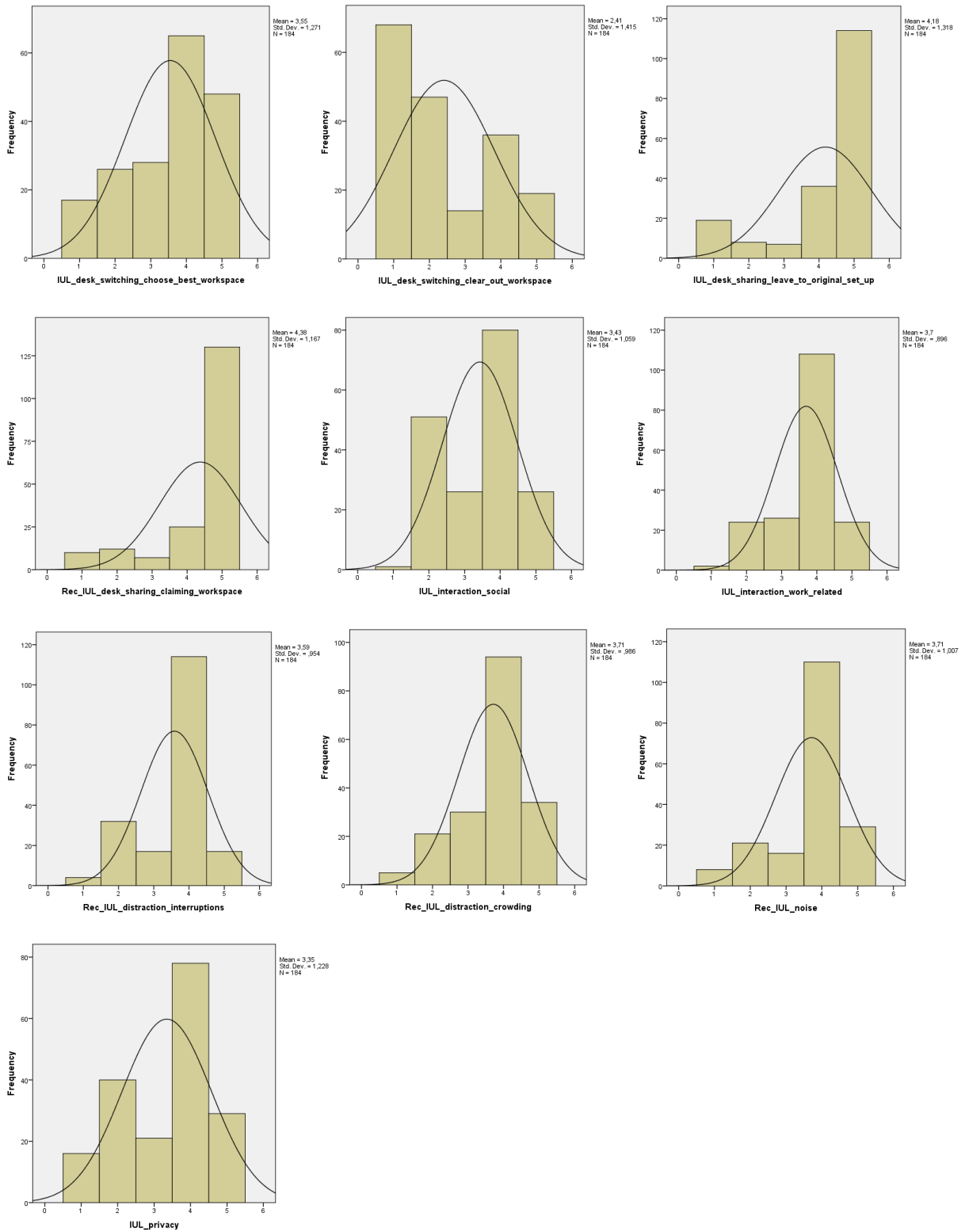




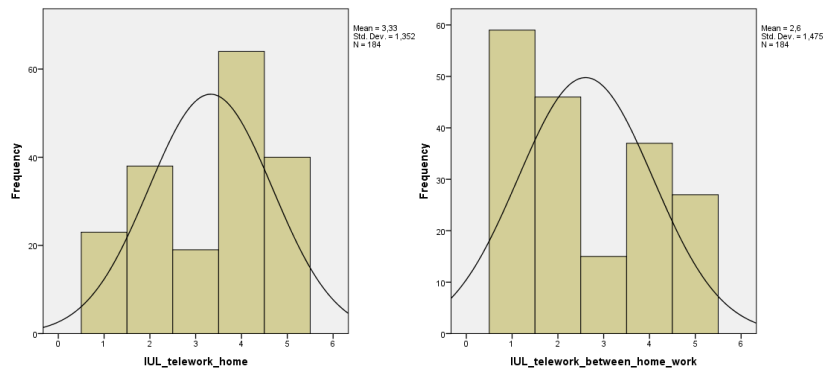
K.3: Accessibility to information and communication technology - Distribution



K.4: Office use - Distribution



K.5: Possibility to telework (office location) - Distribution



Appendix L

L.1: Office use – Total variance explained

Table L.1: Factor analysis office use - Total variance explained

Total Variance Explained							
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
IUL_4	2,177	21,774	21,774	1,668	16,676	16,676	1,357
IUL_5	1,665	16,654	38,428	1,221	12,211	28,887	1,395
IUL_6	1,581	15,810	54,237	,990	9,897	38,784	1,104
Rec_IUL_7	1,052	10,521	64,758	,523	5,229	44,013	0,753
IUL_8	,796	7,963	72,720				
IUL_9	,739	7,393	80,114				
Rec_IUL_10	,592	5,918	86,032				
Rec_IUL_11	,547	5,475	91,507				
Rec_IUL_12	,441	4,407	95,913				
IUL_13	,409	4,087	100,000				
Extraction Method: Principal Axis Factoring.							

L.2: Office use – Screeplot

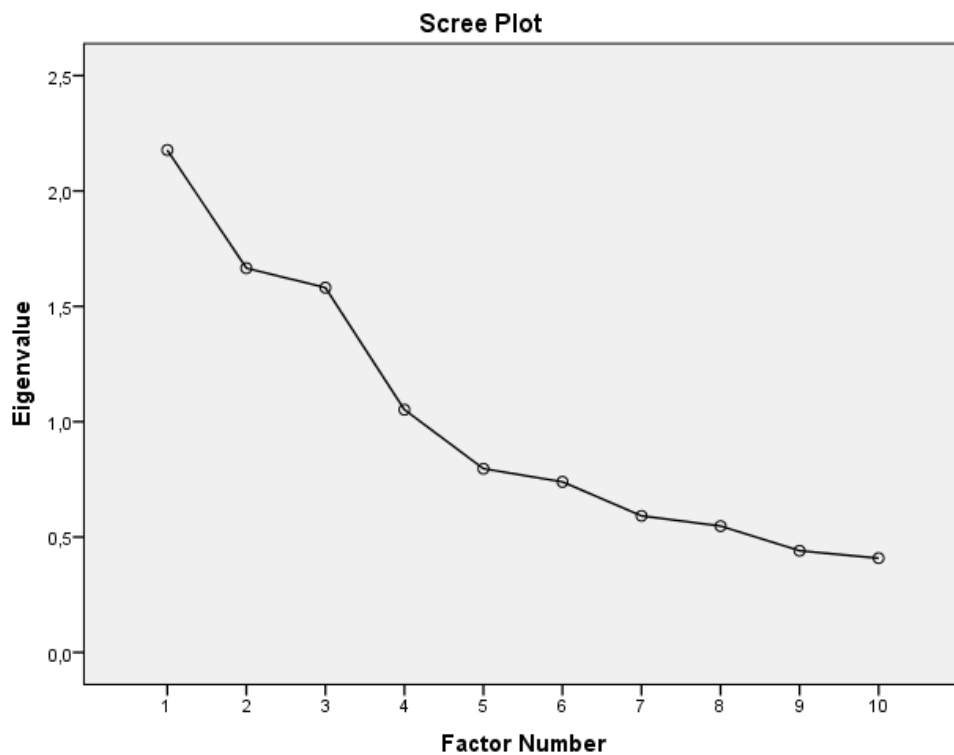


Figure L.2: Factor analysis office use - Screeplot

Appendix M

Multiple regression analyses

Input overview

Table M.1: Overview input variables MRAs

Variables				β	Coding
Independent variables	Physical workplace characteristics	Office layout supportiveness	Overhearing in close proximity (distraction)	β_1	-
		Perceived office comfort	-	β_2	-
		Accessibility ICT	-	β_3	-
		Office use	Interaction	β_4	-
			Distraction	β_5	-
			Desk-switching	β_6	-
	Knowledge worker activities	activities	Formal	β_7	-
			Informal	β_8	-
	Situational variables	Situational variables	Recognition	β_9	-
			Overload	β_{10}	-
			Control	β_{11}	-
			Appreciation	β_{12}	-
	Personality	Personality	Extraversion	β_{13}	-
			Agreeableness	β_{14}	-
			Conscientiousness	β_{15}	-
			Neuroticism	β_{16}	-
			Openness	β_{17}	-
	Socio-demographics	Age	-	β_{18}	-
		Gender	Male	β_{19}	00
			Female	β_{20}	01
	Work-related variables	Workhours	-	β_{21}	-
		Work experience	-	β_{22}	-
Dependent variables	Burnout – engagement continuum	Individual strain	Exhaustion - Energy	-	-

		Interpersonal strain	Cynicism - Involvement	-	-
		Self-evaluation strain	Inefficacy - Efficacy	-	-

Appendix N

Multiple regression analyses

Histograms - normal p-p plots - scatterplots

N.1: Individual strain

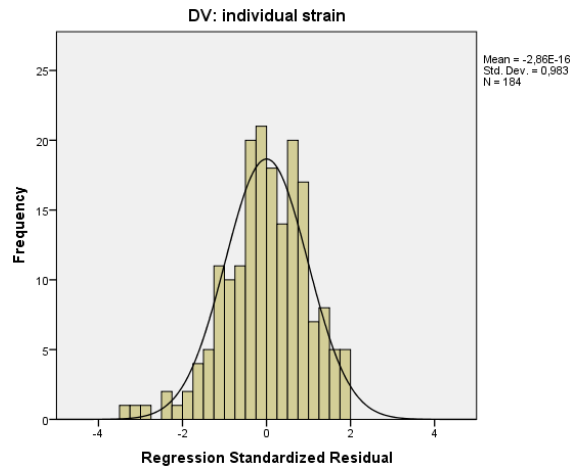


Figure N.1.1: Histogram residuals individual strain

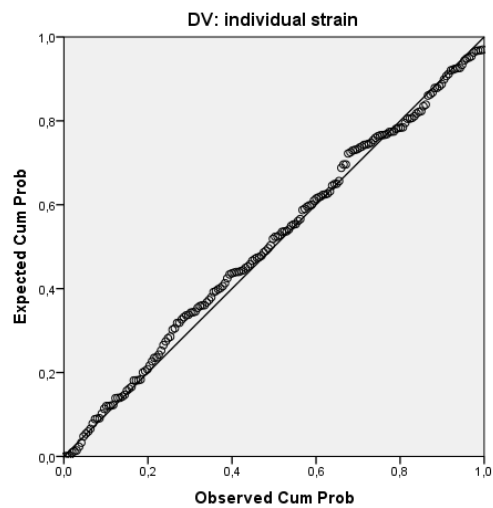


Figure N.1.2: Normal p-p plot residuals individual strain

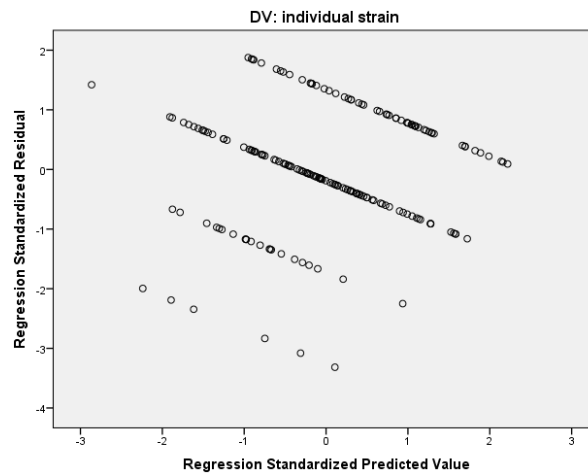


Figure N.1.3: Scatterplot residuals individual strain

N.2: Interpersonal strain

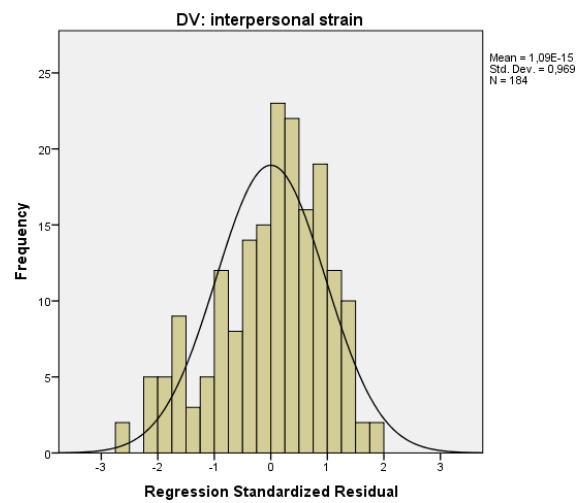


Figure N.2.1: Histogram residuals interpersonal strain

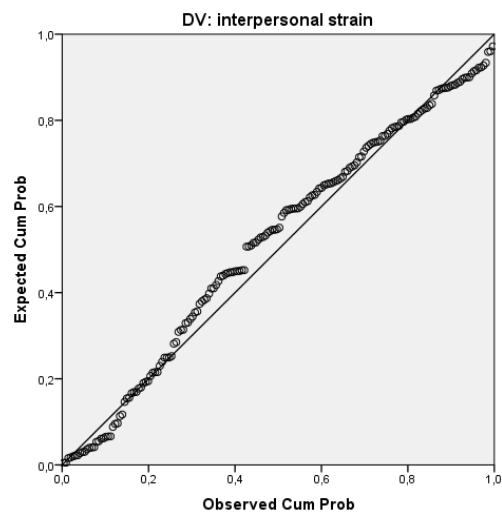


Figure N.2.2: Normal p-p plot residuals interpersonal strain

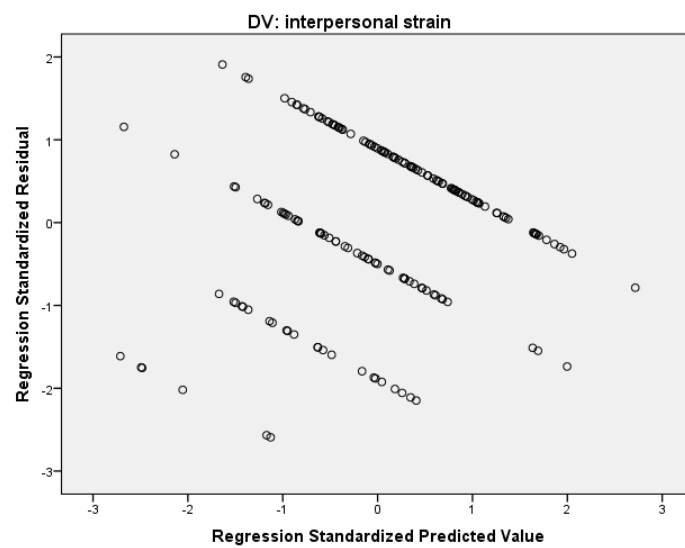


Figure N.2.3: Scatterplot residuals interpersonal strain

N.3: Self-evaluation strain

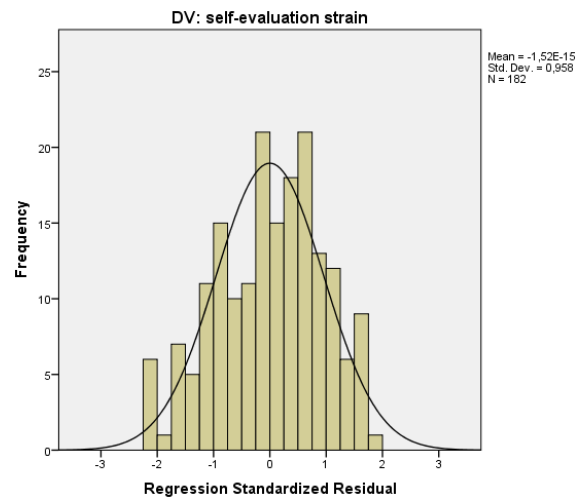


Figure N.3.1: Histogram residuals self-evaluation strain

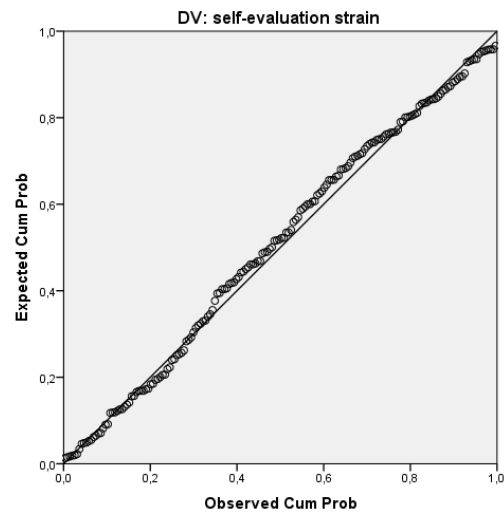


Figure N.3.2: Normal p-p plot residuals self-evaluation strain

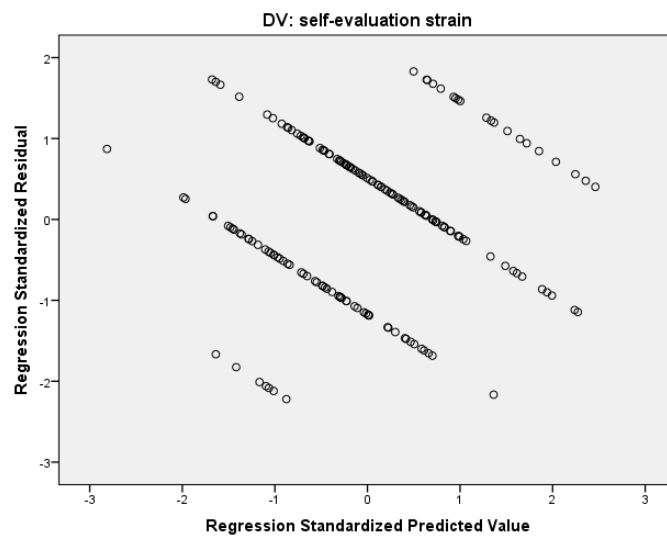


Figure N.3.3: Scatterplot residuals self-evaluation strain