

Research Report 386

**Mari Nislin**

## **Nerve-wracking or rewarding?**

**A multidisciplinary approach to investigating work-related well-being, stress regulation and quality of pedagogical work among early childhood professionals**

To be presented, with the permission of the Faculty of Behavioural Sciences of the University of Helsinki, for public discussion in the Small Hall, Main building Fabianinkatu 33, on Saturday, 9 April 2016, at 10 o'clock.

Helsinki 2016

**Reviewed by**

Professor Liisa Hakamies-Blomqvist, Svenska litteratursällskapet i Finland  
Adjunct professor Kristiina Lappalainen, University of Eastern Finland

**Custos**

Professor Pirjo Aunio, University of Helsinki

**Supervisors**

Adjunct professor Nina Sajaniemi, University of Helsinki  
Professor Margaret Sims, University of New England  
University lecturer Eira Suhonen, University of Helsinki

**Opponent**

Professor Eila Estola, University of Oulu

**Cover illustration**

Inka Niska

Yliopistopaino Unigrafia, Helsinki

ISBN 978-951-51-2011-3 (nid.)  
ISBN 978-951-51-2012-0 (PDF)  
ISSN 1799-2508

**Mari Nislin**

### **Nerve-wracking or rewarding?**

A multidisciplinary approach to investigating work-related well-being, stress regulation and quality of pedagogical work among early childhood professionals.

---

#### **Abstract**

The aim of this thesis was to investigate early childhood professionals' (ECP) stress regulation, work-related well-being and pedagogical work in kindergartens, as well as to determine whether these factors were connected. The demands that ECPs encounter at work and the resources available to them as well as the extent to which they experience engagement or burnout were analysed in order to increase understanding of the challenges involved in work that is simultaneously demanding and rewarding. In this thesis pedagogical work was seen as an indicator of ECP's job performance and quality of the early childhood education service. Furthermore, the focus was on physiological aspects relating to stress regulation. The goal was to enhance knowledge of working life in the field of early childhood education by utilising an interdisciplinary, integrative approach and multiple methodologies.

The study was part of two larger projects undertaken by the Department of Teacher Education at the University of Helsinki and involved two separate data sets. The first set was collected in 2009 from 117 ECPs in 24 kindergartens in the Helsinki metropolitan area. Participants in the second study (2012) were 89 ECPs from 21 integrated special kindergarten groups in the city of Helsinki. Data were collected through salivary cortisol and alpha-amylase measurements, observational assessments of pedagogical work and surveys measuring work-related well-being.

The results indicated that the ECPs generally found their work resources to be adequate, and, on average, their stress regulation was balanced. On average, the ECPs experienced high levels of work engagement, yet there were also participants who were less positive and showed moderate signs of burnout. In addition, the results demonstrated the importance of social support, especially the role of the supervisor, which proved to be one of the key factors positively enhancing well-being at work. The main findings demonstrated the close relationship between ECPs' stress regulation and the quality of pedagogical work in teams. However, no associations between different biomarkers and work engagement and burnout were found.

This study is novel in that it combines approaches from different disciplines to investigate work-related well-being among ECPs. The study highlights the importance of teamwork not only as fundamental to high-quality early childhood education, but also in supporting the well-being of ECPs. The findings can be applied in future studies and used to inform interventions intended to enhance working conditions in kindergartens.

---

*Keywords:* early childhood (special) education, early childhood professionals, stress regulation, work engagement, burnout, pedagogical work

**Mari Nislin**

**Stressaavaa vai palkitsevaa?**

Monitieteellinen tutkimus päiväkodin kasvattajien työssä jaksamisesta, stressin säätelystä ja pedagogisen työn laadusta.

---

**Abstrakti**

Tutkimuksen tarkoitus oli selvittää päiväkodin kasvattajien työssä jaksamista, stressin säätelyä ja pedagogisen työn laatua, ja miten ne ovat yhteydessä toisiinsa. Tutkimuksessa tarkasteltiin kasvattajien kokemuksia varhaiskasvatustyön kuormittavista ja kannattelevista tekijöistä, ja millä tavoin he kokevat työssään työn imua tai uupumusta. Kasvattajien työssä suoriutumista lähestyttiin pedagogisen työn laadun kautta. Lisäksi kasvattajien stressin säätelyä tutkittiin selvittämällä heidän fysiologisia stressivasteitaan. Monitieteellisellä ja – menetelmällisellä lähestymistavalla pyrittiin selvittämään moniulotteisesti päiväkodin kasvattajien kokemuksia varhaiskasvatustyöstä ja millaisia edellytyksiä heillä on tehdä pedagogisesti laadukasta työtä.

Tutkimus oli osa kahta suurempaa tutkimushanketta, jotka toteutettiin Helsingin yliopiston Opettajankoulutuslaitoksella vuosina 2009 ja 2012. Ensimmäisen osatutkimuksen osallistujat (n=117) olivat päiväkodin kasvattajia kahdesta kunnasta pääkaupunkiseudulta. Toiseen osatutkimukseen osallistui päiväkodin integroitujen erityisryhmien kasvattajia (n=89) 21 päiväkodista Helsingistä. Aineisto kerättiin työn vaatimuksia ja voimavaroja sekä työn imua ja uupumusta mittaavilla kyselyillä, stressin säätelyä mittaavilla syljen kortisoli ja alfa-amylaasinäytteillä sekä havainnoimalla päiväkotiryhmien pedagogista laatua.

Tulosten mukaan päiväkodin kasvattajat kokivat huomattavan paljon työssään työn imua ja he pitivät työnsä voimavaroja hyvinä. Keskimäärin kasvattajien stressin säätely oli tasapainossa, ja vain pienellä joukolla stressitasot olivat poikkeavat. Kuitenkin joukossa oli kasvattajia, jotka kokivat työssään kuormitusta ja lievää työuupumusoireilua. Voimavaroilla, erityisesti sosiaalisella tuella esimieheltä ja kollegoilta näytti olevan positiivinen yhteys kasvattajien stressin säätelyyn sekä pedagogisen työn laatuun. Myös työn imulla oli yhteyttä pedagogiseen työhön tiimeissä. Vaikka stressin säätely oli yhteydessä pedagogiseen työhön, sillä ei kuitenkaan ollut yhteyttä työn imuun tai uupumukseen.

Tutkimus vahvistaa käsitystä työyhteisön merkityksestä työssä jaksamiselle ja stressin säätelylle. Erityisesti esiin nousee tiimityöskentely, jolla ei ole ainoastaan merkitys laadukkaan pedagogisen työn kannalta vaan myös

kasvattajien tiimin jäsenten hyvinvointia vahvistavana tekijänä. Tutkimuksen tuloksia voidaan hyödyntää jatkotutkimuksissa, joissa pyritään selvittämään työyhteisön hyvinvointia vahvistavia mekanismeja. Lisäksi tuloksia voidaan soveltaa suunniteltaessa kehittämistoimenpiteitä varhaiskasvatuksen alalla työskentelevien työolojen parantamiseksi.

---

*Avainsanat:* varhais(erityis)kasvatus, kasvattajat, stressin säätely, työn imu, työuupumus, pedagoginen työ

# Acknowledgements

Preparing my doctoral thesis has taught me a great deal about stress regulation. During this journey the physiological and psychological changes that body and mind undergo in the course of stressful events have become familiar as research topics, but I also have acquired an extensive, subjective relationship with the phenomenon. Doing research can at times be nerve-wrecking and exhausting. At the same time, it is extremely rewarding and offers numerous moments of enthusiasm and joy. I have learnt that stress is not always a bad thing; it is also a vitalizing factor for proper channelling of energy in pursuing valuable goals. Without the boosting effect of stress, this dissertation could not have been completed. However, what has become particularly clear to me in writing this dissertation is that stress regulation and coping at work are not just subjective and individual matters: other people are needed for support and co-regulation. Without others I could not have succeeded.

I have been extremely fortunate to have so many supportive and compassionate people near me all these years. I owe my deepest gratitude to “my ladies”, my wonderful supervisors: Adjunct professor Nina Sajaniemi, Professor Margaret Sims and University lecturer Eira Suhonen. They have given me valuable guidance throughout the journey and shored me up when I could not have made it on my own. They have allowed me the freedom and autonomy at the right moments to build my own identity as researcher. Nina, I am grateful for your endless trust in me. I have learnt so much from you and am impressed by your integrative scientific thinking and your unyielding attitude. Margaret, I want to thank you for guiding me in scientific writing and for your support during publication processes that can be challenging. I am also grateful for your kindness and hospitality during my stay in Australia. Eira, you have been a great support and a mentor during this process. I am grateful for your insightful guidance on conducting research, for sharing your expertise in early childhood education with me and for our various, meandering conversations about life in general. I also appreciate my ladies for the numerous shared moments we have spent together “out of the office”: those numerous congress and writing trips in Finland and abroad. This has been a memorable time.

I would like to thank Professor Eila Estola from the University of Oulu for accepting the invitation to be my official opponent. I owe many thanks to my pre-examiners Professor Liisa Hakamies-Blomqvist from the Svenska litteratursällskapet i Finland and Adjunct professor Kristiina Lappalainen from the University of Eastern Finland for valuable, constructive and insightful feedback. Your suggestions and remarks have definitely improved my thesis.

Then to my dear colleagues in the Special Education section: I have spent meaningful years with you, and I want to express my deepest thanks to you all. Before I was even thinking about doing research, I found myself working at the Special Education section at the University of Helsinki as a summer trainee in 2009. It was a significant coincidence, I now realise. During these years I have been very privileged to work with such great colleagues. You all have treated me positively and with kindness, and you have supported me and shared your knowledge and expertise when needed. I want to thank especially Professor emeritus Jarkko Hautamäki, for his gentle guidance all the way from my master's thesis to this moment. His wise and valuable advice throughout the dissertation process has been indispensable. I would also like to thank Adjunct professor Elina Kontu, for her encouragement from the very early stages of my research career and for support whenever I encountered challenges during this process. I am grateful to University lecturer Ritva Ketonen for sharing her scientific expertise, and, as important, showing a sophisticated taste for beautiful decoration and design. Thank you for the exchange of “professional literature” such as *Deko* and *Glorian koti*.

I have also been fortunate to work with inspiring researchers in the LASSO research group. My thanks go to all—Alisa Alijoki, Laura Repo, Marja Syrjämäki, Jonna Kesäläinen, Inka Niska and Sivi Harkoma—for their encouragement and support during these years. Our rambling conversations have been revitalizing and inspiring, and they have definitely reinforced my trust that this is the right way to go. I especially want to thank Alisa for the compassionate support shown towards my research and my personal life. Laura, I owe you many thanks (and glasses of bubbly!) for endless encouragement and numerous humorous moments inside and outside the academic world.

I wish to express my gratitude to all my co-authors whose help was irreplaceable during the article publication process. I wish to thank Professor Enrique F. Maldonado for sharing his expertise relating biomarkers of stress and helping me to understand better the complex phenomenon of stress regulation. I thank Associate professor Risto Hotulainen for his guidance in methodological issues and also for being such a delightful neighbour to Henri and me in Siltavuorenpenger. I also want to thank Adjunct Professor Ari Hirvonen and Specialist Sirpa Hyttinen for our long collaboration in analysing salivary cortisol and alpha-amylase samples, and for their contributions to the writing process.

During the work on this thesis, I had the opportunity to begin a new fruitful collaboration with the amazing researchers in the DAGIS consortium. I am extremely happy that we share the same enthusiasm and desire for conducting genuine interdisciplinary research. Working with them has been both rewarding and great fun. I wish to thank Eva Roos, Carola Ray, Reetta Lehto, Suvi Määttä, Riikka Kaukonen and Elviira Lehto from Folkhälsan, Maijaliisa Erkkola and Liisa Korkalo from the University of Helsinki and Sampsa Puttonen and Leila



Hopsu from the Finnish Institute of Occupational Health for their encouragement and support.

I want to express my warmest thanks to all those doctoral students—Raisa Ahtiainen, Meri Lintuvuori, Riikka Mononen, Maiju Paananen, Sanna Kivijärvi, Irene Rämä and Henri Pesonen—in the Special Education and Early Childhood Education sections for sharing the dissertation process with me. I am grateful that I had such great persons beside me. We have shared joyful and inspiring moments, and also faced challenges and drawbacks that are an inevitable part of such work. My thanks to Raisa, Meri and Riikka for our memorable “Wine & writing” meetings and for the numerous conversations and coffee breaks at Siltavuorenpenger. My thesis has definitely improved thanks to these encounters. I thank Maiju for her kind and wise support and for sharing her expertise in Early Childhood Education. My dear Henri, I am extremely grateful that I have had an opportunity to live this journey with a reliable and good friend like you. You have been there for me; there have been tough times, but together we have also celebrated and enjoyed the good days. We definitely share a strong sense of belonging.

I am grateful to the Finnish Work Environment Fund, the Otto A. Malm Foundation, the Research Foundation of the University of Helsinki and the Siiri Valli Foundation for funding my doctoral thesis. In addition, I wish to thank the OKKA Foundation, the Finnish Concordia Foundation and the Chancellor of the University of Helsinki for the travel grants that enabled me to attend international conferences. I would like to thank Juhani and Inkeri Virkkunen for their kindness and hospitality and for offering an inspirational environment for writing my thesis in Malaga.

I am extremely grateful to all my dear friends. You have been of great support and encouragement during the work on this thesis, but most importantly, you have brought so much joy and happiness to my life. I want to thank you, Irene Huupponen, for your encouragement and for staying beside me. Meri Ekola, thank you for sharing the ups and downs in my life, and always being there for me. And thanks to my wonderful gang, the “Alppila Posse”. Thank you, Emilia Suhonen, Masi Hukari, Noora Puhakka, Mika Kurvinen, Anna Malkamäki and Mikko Mäkinen for making Helsinki my home and being such loving and caring friends. Silja Rätty, my dear “Makkonen”, you have shared such a long journey with me, and you have been a loving, reliable, humorous and honest friend. That is something incredibly precious. Thank you.

I wish to thank Marjatta and Ossi Rätty and my godparents Tuula and Vesa Asunta for being sensitive and supportive adults in my life. I am grateful that your doors have always been open to me. I also want to express my gratitude to my grandparents, Eila and Kalevi Silosarka and Kaarina and Erkki Nislin, who have always encouraged me in my studies.

During the course of my doctoral journey, I was extremely happy to acquire new family members. I am grateful to Johanna and Hannu and all the Saha family for being so kind and supportive and embracing me as a part of their family. Thank you all for your encouragement.

I wish to express my deepest gratitude to my family, without whom this doctoral thesis would not have become a reality. You have been loving and caring and have encouraged me to reach for my dreams. My brother Mikko, you have been the trusted person in my life. Thank you for being beside me, and always looking after me. Aija, my soon to be sister-in-law, I am thankful that you are in my life and grateful for your kindness and endless support. I thank my parents, Tuija and Tapani, for your endless love and for living beside me. I appreciate the humane values and attitudes you have shared at home. That loving and conversational atmosphere has had a huge influence on my educational, scientific and social thinking, but most of all in teaching me how to treat other people and to appreciate life's diversity.

Topi, thank you for your love and living this journey beside me. I am deeply grateful having you in my life.

Helsinki, March 2016  
Mari Nislin

# Contents

<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1. A multidisciplinary approach to investigating work in early childhood education .....	1
1.2. Challenging and rewarding interpersonal work in ECE .....	2
1.3. Multiprofessional working context in ECE .....	4
<b>2 PEDAGOGICAL WORK, WELL-BEING AND STRESS REGULATION AMONG EARLY CHILDHOOD PROFESSIONALS</b> .....	<b>7</b>
2.1. Theoretical framework and key concepts .....	7
2.2 Pedagogical work as an indicator of job performance in early childhood education .....	9
2.3 Work-related well-being: balance between ECPs' work demands and resources .....	12
2.3.1 Two sides of work: work engagement or burnout .....	14
2.4 Physiological measures of workplace stress and well-being .....	16
2.4.1 Salivary cortisol and alpha-amylase: biomarkers of stress .....	16
2.4.2 Work and stress regulation.....	18
2.4.3. Ratios of salivary alpha-amylase and cortisol: a unique method for analysing stress regulation.....	19
<b>3 THE AIM OF THE STUDY</b> .....	<b>21</b>
<b>4 METHODS</b> .....	<b>25</b>
4.1. Participants and procedure.....	25
4.2. Measures.....	26
4.3. Analyses.....	30
<b>5 MAIN FINDINGS</b> .....	<b>33</b>
5.1. ECPs' job demands and resources and their associations with cortisol activity and pedagogical work .....	33
5.2. Free salivary cortisol and alpha-amylase in determining ECPs' stress regulation.....	37
5.3. ECPs' work engagement, stress regulation and their associations with the quality of pedagogical work in integrated special kindergarten groups .....	38

6 DISCUSSION.....	43
6.1. Limitations.....	47
6.2. Conclusions and future directions.....	50
REFERENCES .....	55

## List of tables

Table 1. Overview of the study design

Table 2. Descriptive statistics for job demands and resources among ECPs in regular kindergarten groups.

Table 3. ECPs' experienced burnout and work engagement according to profession, age and period of employment

Table 4. Correlations between salivary cortisol and  $\alpha$ -amylase variables and pedagogical work and between work engagement and pedagogical work

## List of figures

Figure 1. ECPs' average diurnal salivary cortisol (nmol/l) pattern.

Figure 2. The ECPs' cortisol levels at five measurement points sorted into low, moderate and high groups based on AUCg values (nmol/l).

Figure 3. Initial level cortisol and its change using educational qualification and teamwork of ECPs as predictors

# Original articles

This thesis is based on the following three original publications, which are referred to in the text by Roman numerals (Studies I-III). The original articles are reprinted with the kind permission of the copyright holders.

**Study I.** Nislin, M., Sajaniemi, N., Sims, M., Suhonen, E., Hotulainen, R., Hyttinen, S., Hirvonen, A. (2015). Work Demands and Resources, Stress Regulation and Quality of Pedagogical Work among Professionals in Finnish Early Childhood Education Settings, *Journal of Early Childhood Education Research*, 4(1), 42–66

**Study II.** Nislin, M., Suhonen, E., Sajaniemi, N., Sims., M., Maldonado, E.F., Hyttinen, S., Hirvonen, A. (2016). Occupational Wellbeing and Stress: the use of an innovative strategy to measure stress reactivity in the workplace”, *Open Review of Educational Research*, 3(1), 1-17

**Study III.** Nislin, M., Suhonen, E., Sajaniemi, N., Sims., M. Maldonado, E.F., Hirvonen, A., Hyttinen, S., (2015). Pedagogical Work and Work-related Wellbeing among Early Childhood Professionals in Integrated Special Day Care Groups, *European Journal of Special Needs Education*, 10.1080/08856257.2015.1087127

# 1 Introduction

## 1.1. A multidisciplinary approach to investigating work in early childhood education

In the field of early childhood education (ECE), research has provided abundant evidence that early childhood professionals (ECPs<sup>1</sup>) are the key actors in creating high quality learning activities and early childhood practices that optimally support children's development. A number of studies (e.g. Early et al., 2007; Sims, 2007; Vandell & Wolfe, 2000; NICHD, 2000; Suhonen, 2009) have pointed out the factors in ECE that are associated with higher ECE quality. Moreover, the extent to which quality factors are beneficial to children has been widely documented. It is well known, for example, that ECPs' qualifications (Burchinal, Cryer, Clifford & Howes, 2002), their sensitivity in interacting with children (Mashburn et al., 2008) and their ability to work in teams (Sajaniemi et al., 2013) are fundamental to higher quality ECE and is seen in children's better learning outcomes and well-being. However, fewer studies have focussed on the ECPs' well-being and work satisfaction and how these are associated with their delivery of ECE. In order to understand better the construct of high quality early childhood education, we need not only to evaluate the quality of ECE service, but also investigate the working conditions, including both the challenges and the positive aspects that ECPs encounter at work.

The interest in studying job-related satisfaction, motivation and well-being has a long tradition in psychology, social psychology and organizational psychology (e.g. Hakanen, Bakker & Schaufeli, 2006; Maslach & Leiter, 2008; Alimo-Metcalfe, Alban-Metcalfe, Bradley, Mariathasan & Samele, 2008). Furthermore, the aspects of work-related well-being that can be associated with efficiency, productivity and job performance have been examined in management and organizational studies (e.g. Baptiste, 2008; Leroy, 2012). Yet even though the quality of pedagogical work has been an area of educational research and teachers are widely used as a study population in research on occupational well-being (Hakanen, Bakker & Schaufeli, 2006; Kyriacou, 2001; Collie, Shapka, Perry & Martin, 2015), there is a lack of studies on job performance in terms of pedagogical work and teachers' experiences of well-being at work. Although the perspectives, methods and implications of the results might be different in different disciplines, the phenomenon in question is shared. All these fields – education, psychology and economics – try to

---

<sup>1</sup> In this thesis the term Early Childhood Professionals (ECPs) is used to refer to those working in all of these roles in special or regular kindergarten groups.

understand human activity and the underlying mechanisms that make work meaningful, satisfying, effective and of high quality. Nevertheless, it seems that the distance between disciplines is often great, and conducting genuine interdisciplinary research is challenging. Even so, in the present-day academic world, the claim for interdisciplinary research is a general aim in research objectives. As Professor Mäki (2014, 43) states:

Interdisciplinary research is a slogan that vibrates in our time. It echoes in science policy, in meeting rooms of university administrations, in academic speeches and universities' programmatic declarations, as well as, of course, in research funding. The main message is clear: it is needed more.

This thesis takes a step towards interdisciplinary research in an effort to bridge the disciplines of education, psychology and neurobiology. The goal is to initiate discussion and strengthen the idea of genuine collaboration. The thesis emphasizes an integrative and phenomenon-based approach to investigating everyday working life among ECPs in kindergartens. The uniqueness of the study is the multidisciplinary approach in investigating the ECPs' work; the aim is to combine information about ECPs' experience of work satisfaction, physiological data regarding their stress regulation and the observed quality of their pedagogical work. The research topic is highly current, because ongoing debate about reductions in education affects ECE with potentially severe consequences. Such reductions present a potential risk, since high-quality early childhood education and early childhood special education are regarded as effective ways to offer early intervention, prevent social exclusion and increase social justice. In the current situation in Finland, the changes might have unpredictable effects on the lives of children and their families, as well as on the work of ECPs. The general background idea to this thesis is as follows: in order to understand the actions that make early childhood education beneficial to children, we need to acknowledge the adults who work with the children and in the children's best interest.

## **1.2. Challenging and rewarding interpersonal work in ECE**

In general, studies have demonstrated that the work of ECE may challenge ECPs' work-related well-being and increase their experienced stress (Zhai, Raver & Li-Giring, 2011; Emery & Vandenberg, 2010). The tasks are challenging and demand responsible, reliable teachers (Corr, LaMontagne, Cook, Waters & Davis, 2015). However, there is a paradox in that the general appreciation of ECE work and the high level of responsibility required do not match. ECE work is not highly respected in society (e.g. in western societies,



including Finland); in addition, it is poorly paid (Andrew & Newman, 2012). Andrew and Newman (2012, 242) state, “As with other feminised fields, this caring labour involves a high level of emotional management, of the self and others, which remains undervalued as a skill within discourses of professionalisation.” As a result, the emotionally-loaded interpersonal work in ECE is not highly valued, which is extremely unfavourable for ECE personnel. Their ability to deliver the best possible education and care to children depends in part on their working environment and the working conditions (Hall-Kenyon, Bullough, MacKay & Marshall, 2014). In a worst case scenario a lack of societal appreciation may further weaken the ECPs’ working conditions and professional position, and this has a knock-on effect, affecting the political will to invest in ECE, particularly in the area of improving ECPs’ working conditions.

Nevertheless, the whole picture of ECE is not necessarily gloomy. Indeed, in the midst of their challenging work, ECPs may experience their work with children as rewarding. There are numerous positive characteristics that keep ECPs engaged and motivated. The core of the work, which is supporting and following the children’s development and learning, may be gratifying and enhance ECPs’ job satisfaction. After all, Roffey (2012) suggests that an effective and supportive work environment is one in which adults and children both experience well-being. To understand ECPs’ everyday working life, the dual nature of highly demanding and highly rewarding ECE has to be taken into account.

Traditionally, in research on occupational well-being, the emphasis has been on identifying the negative aspects of work that threaten the well-being of individual professionals (Hakanen, 2009a; Demerouti, Nachreiner, Bakker & Schaufeli, 2001; Schaufeli, Taris & van Rhenen, 2008). Recently, more interest has been shown in investigations that combine both negative and positive elements in understanding more broadly the multidimensional nature of work-related well-being (Schaufeli, Salanova, Gonzalez-Roma and Bakker, 2002; Hakanen, 2009a). Among ECE staff, this is precisely the situation. Pietarinen, Soini and Pyhältö (2008) point out that the core of the pedagogical work – interactions with children – is not only demanding and challenging, but also rewarding. In general, teaching is regarded as mentally challenging interpersonal work which is loaded with expectations of children, parents and society (Hakanen, 2009a). Professionals in education and childcare may experience multiple emotional challenges, including children’s socio-emotional difficulties (including motivational problems) and challenging behaviours (Bakker, Demerouti, Hakanen & Xanthopoulou, 2007; Hakanen, Bakker & Schaufeli, 2006; Raver et al., 2009). Likewise, in every profession, general demands and challenges such as hectic days, noise and inadequate physical working environments challenge ECPs in kindergartens (Bakker & Demerouti, 2006; Schaufeli, Bakker & van Rhenen, 2009). Moreover, problems in the social

working environment such as poor teamwork may challenge ECPs' autonomy to conduct the best possible ECE practices. Role conflicts and unclear distribution of work responsibilities may dilute the flow of daily work and negatively affect the social atmosphere among co-workers. Less social support from colleagues and a supervisor may increase the risk of stress symptoms such as burnout (Schaufeli et al., 2009). Pierce and Gardner (2004) have shown that employees with low self-esteem at work regard their job as more demanding. This has a negative impact, not only on employees' work performance but, perhaps more importantly, on their overall well-being (Bollini, Walker, Hamann & Kestler, 2004).

However, even if work demands may challenge well-being, there are also positive aspects at work that enhance well-being among ECE personnel. Studies have shown that, despite the negative aspects, early childhood employees feel that their work is meaningful and engaging (Estola, Erkkilä & Syrjälä 2003), and basic functions such as caring for the children and teaching them are considered to contribute to work satisfaction and joy (Rantala & Määttä, 2011). This indicates that in the field of ECE, professionals are dedicated to and engaged in their work. They are aware of its meaningfulness, which certainly enhances their motivation to work with children. The creative and enjoyable nature of early childhood work appears to be experienced as beneficial by ECPs (Ylitapio-Mäntylä, Uusiautti & Määttä, 2012). Another positive sign is that, compared to many other sectors, in general Finnish teachers are less inclined to look for new job opportunities (Finnish Institute of Occupational Health, 2010; Hakanen et al., 2006). This indicates that in the midst of challenging work, ECPs experience their work as meaningful, and this contributes to children's well-being.

### **1.3. Multiprofessional working context in ECE**

Whilst job satisfaction and work-related well-being have been traditionally investigated from the perspective of the individual employee, more interest has been put on the working community and the extent to which work-related well-being is a group phenomenon involving a crossover of well-being among co-workers (Torrente, Salanova, Llorens & Schaufeli, 2012; Perhoniemi & Hakanen, 2013; Hakanen, Perhoniemi & Bakker, 2014). Given the focus on teamwork in ECE, the working community is a very important element. In kindergartens, ECPs collaborate in multi-professional teams (Nummenmaa & Karila, 2006). In Finland, this involves kindergarten teachers,<sup>2</sup> special teachers, nursery nurses and assistants with various educational backgrounds and pedagogical qualifications. National guidelines serve as a basis for the design of

---

<sup>2</sup>In this thesis the terms kindergarten teacher or teacher are used for those responsible for pedagogy in early childhood professionals' teams.

local curricula, although municipalities are responsible for the implementation and steering of these services (Suhonen & Nislin, 2012). This means that there is some regional variation in organizing ECE and in the composition of the ECP teams. However, in the Helsinki metropolitan area, for example, at least one kindergarten teacher who is responsible for pedagogy and planning activities is required in every group. In the event that a child needs some support, a special teacher is available. Kindertgartens may include integrated special kindergarten groups (five children with special educational needs per group and seven children without special needs).<sup>3</sup> Early special education can also be organized in segregated special groups if more profound and intensive support is needed.

The ECPs' qualifications reflect their positions and responsibilities on ECE teams. However, teams and kindertgartens vary in how they allocate responsibilities to differently qualified team members. This sometimes results in a lack of clarity around the distribution of work, while tasks and duties are not bound to the educational qualification of the ECP (Onnismaa & Kalliala, 2010). However, all these professionals work together, sharing the same general focus on caring for children's well-being and learning. In addition, ECPs' work is also supported by other professionals such as speech therapists, psychologists or occupational therapists, who are consulted for their expertise when needed (Pihlaja, 2006). This kind of social and professional support may positively enhance ECPs' capacity to cope with the challenges encountered at work. For example, they receive support on how to work with children with special educational needs and from various backgrounds, and in meetings with the multiprofessional team they have the opportunity to plan supportive actions and possible interventions.

In Finland ECPs are generally well qualified and educated. Compared to many other countries (see e.g. Sims & Wanigayanake, 2015; OECD, 2006; 2012), Finnish kindergarten teachers, and especially the special teachers, are highly educated. The qualifications of a kindergarten teacher consist of a lower university degree or a bachelor's degree in the social sciences (Heinämäki, 2008). In addition, there are nursery nurses (and in some cases assistants) with a lower educational degree from a vocational school. Nearly all of these degrees include some courses in early childhood education and care. The training of the nursery nurses and assistants focuses more on nursing and caring, whereas the degree earned by kindergarten teachers focuses on early childhood education. An additional degree in early childhood special education is required of special education teachers. This additional degree gives special teachers the skills and

---

<sup>3</sup> Different terminology is used across the municipalities for describing the special education groups in kindergarten. In this thesis the term "integrated special kindergarten group" is used, as it is the term used in the municipalities where the present study is conducted.

knowledge required to understand children's individual developmental characteristics and educational needs. Based on these notions, the teachers plan and organize pedagogical actions that support and enhance the children's development, learning and well-being. In integrated special groups, the minimum requirement is two special education teachers, one nursery nurse and possibly one assistant.

The nature of ECE work is multiprofessional and interpersonal. It is clear therefore that ECPs' occupational well-being is a complex phenomenon representing the interplay among individual employees and the entire working community. From the systemic perspective, work-related well-being is a shared phenomenon of the people who work together, and hence it is important to study both individual elements and aspects relating to teamwork. It has been shown that the positive or negative emotions an individual feels in relation to his/her work may have an impact on other people on the same team (Bakker & Xanthopoulou, 2009; Perhoniemi & Hakanen, 2013). The emotional climate of the team can affect the team's well-being as well as the wider work environment (Bakker, Demerouti & Schaufeli, 2003; Totterdell, Kellert, Teuchmann & Briner, 1998) and children's behaviour and learning. It is known that individuals respond to different environmental stressors and supports in different ways (Kyriacou, 2001). Thus, a simple analysis of existing stressors and supports alone is not sufficient to determine work-related well-being. Recent research has shown that an employee's well-being at work is not based only on individual, organizational or contextual factors (see e.g. Langelaan, Bakker, van Doornen & Schaufeli 2006; Möttönen and Hintsanen, 2011; Siegrist et al., 2004). It is also influenced by the state of well-being of other colleagues (Perhoniemi & Hakanen, 2013). Work in kindergartens is intensively interpersonal (interactions between adults and children, and between adults working on the same team), and in optimal cases offers numerous positive moments of interaction during the working day.

## **2 Pedagogical work, well-being and stress regulation among early childhood professionals**

### **2.1. Theoretical framework and key concepts**

“In science – as well in life in general– nothing can be understood without a theory” (Wilson, 2001, 62).

The theoretical framework of this thesis is based on the idea of positive psychology. Instead of researching pathologies and illnesses, the main research objects in positive psychology are normal and healthy people, and the interest is in determining which factors make their lives more meaningful and happy (Seligman & Csikszentmihalyi, 2000). At the centre is one’s life: what makes it positive, what factors support it and what can make it even better (Gable & Haidt, 2005). In investigating working life, this kind of research focuses on identifying the factors that enable people, groups and institutions to function optimally (Gable & Haidt, 2005; Linley, Joseph, Harrington & Wood, 2006), instead of just charting the drawbacks of work. In the present study the ECPs’ working conditions and well-being at work are considered as they have been demonstrated in positive psychology (Lopez & Snyder, 2009; Seligman & Csikszentmihalyi, 2000), which posits work-related well-being as associated with work engagement. Establishing work-related well-being, and the positive psychology goal of happiness, is supported by a clear understanding of what well-being (or happiness) looks like. And a considerable body of research has been devoted to determining how best to identify and measure these concepts.

The framework of positive psychology does not deny the negative aspects of life, the demands and sorrows that people must deal with. Rather it is a framework that allows us to understand optimal functioning and a happy life by taking into account both positive and negative aspects and emphasizing the resources that are vitalising and necessary for a better life. In this study the framework of positive psychology is understood in exactly this way, namely that by investigating both the demands and the burdens of pedagogical work as well as those resources that enhance ECPs’ motivation and work satisfaction, it is possible to obtain a broader picture of ECPs’ working conditions and everyday lives. As is known, well-being at work does not specifically mean the absence of malaise (Hakanen, 2009a). It is important to investigate the continuum of well-being, meaning both the bright side of working life and the negative aspects that may threaten well-being. In the literature these two poles of a continuum are defined by the concepts of burnout and work engagement. In the present thesis

these concepts are utilized to describe ECPs' experiences with and attitudes to work, or in other words, how engaging or exhausting do they experience their work in ECE to be.

The aim of the thesis is not only to investigate ECPs' experiences, but also to combine that information with physiological data on the ECPs' stress regulation. The thesis investigates ECPs' stress regulation and work satisfaction and their associations with job performance by adapting a multidisciplinary perspective. In analysing stress regulation, physiological biomarkers of stress, cortisol and alpha-amylase are utilized. ECPs' job performance is defined as the concept of pedagogical work constructed in the interactional processes between children and ECPs. The aim of the work of ECPs is to ensure a high-quality learning environment that enhances every child's participation, learning and well-being. From the perspective of positive psychology, pedagogical work is seen as a product formed in the interaction between child and adult participants in kindergarten groups. Thus, the aim of pedagogical work is to create learning opportunities for children and enhance social interaction between children and adults. Pedagogical work is bidirectional; it not only affects the individual child or children, but also involves an entire working culture, one in which ECPs are likely to encounter learning opportunities and positive experiences on a daily basis. The study population for the present thesis consists of early childhood professionals in both regular and special kindergarten groups. The unique characteristics of these two settings are described, but in order to avoid confusion in the titles of different professions, the general term "early childhood professional" is used to mean adults working in early childhood educational settings.

Methodologically, the thesis combines the traditions of educational science, psychology and neurobiology, and by utilizing the integrative approach, aims to enhance wider knowledge as well as broaden the boundaries of the specific disciplines. The philosophical basis of the thesis stems from the idea of consilience, the notion that explores the extent to which different scientific disciplines may be effectively combined to create deeper knowledge (Wilson, 2001). The basic idea of consilience is to unify different disciplines and create a uniform concept of knowledge. The idea of consilience, advanced by Edward O. Wilson (2001), is still current today. There is a need to remove artificial boundaries in science. Piha and Rantala (2015) stress that consilient science is not about defending one's own position, but rather about dialogue. They argue that natural and behavioural sciences do not differ that much; rather they investigate exactly the same realities, only with different emphases. In the present thesis the idea of consilience is applied in the same way. Instead of investigating pedagogical practices, work-related satisfaction and stress regulation as separate phenomena, the main interest here is in investigating them together and in the natural working environment and determining the extent to

which these phenomena are associated. This means utilizing multiple methodologies, combining self-report surveys, observational assessments and physiological measurements.

The thesis is integrative and phenomenon-based. In this type of research, one challenge is to develop uniform concepts, as different disciplines describe the same phenomenon using different concepts and definitions. As Hari et al. (2015) point out, with each discipline fighting for its own territory, consensus about concepts is lost, and comprehension of the nature of different disciplines is lacking. The concepts applied are described in the context of the present study. It is known that in different research traditions these concepts might have different associations and theoretical underpinnings. However, to enable clear and comprehensive understanding, the concepts are defined here as they appear in the literature. In the following sections the theoretical framework and key concepts are explored in more detail.

## **2.2 Pedagogical work as an indicator of job performance in early childhood education**

In this study the quality of pedagogy is seen as an indicator of ECPs' performance in ECE work. Generally, studies in the field of occupational well-being have demonstrated close associations between employees' well-being and their productivity and efficiency at work (Hakanen, 2009a; Hakanen et al., 2006; Xanthopoulou, Bakker, Demerouti & Schaufeli, 2009). Employees who show higher levels of work engagement and enthusiasm perform better at work (Halbesleben & Wheeler, 2008). It has further been shown that the well-being of the individual employee tends to boost the well-being of co-workers. An individual employee's energy and positive attitude create a feedback loop, which enriches the entire working community (Costa, Passos & Bakker, 2014).

However, in the field of early childhood education defining productivity and efficiency is not an easy task compared to many other sectors and jobs. Instead, performance in ECE work could be approached by examining how children's opportunities for learning and social interaction with peers are organized and offered by ECPs. In this thesis the concept of pedagogical work is employed to describe these pedagogical actions. In the context of early childhood education, pedagogical work is actualised in interactional processes between children and ECPs. Pedagogical work not only reflects on the job performance of an individual ECP, but also is an outcome of multiprofessional teamwork brought about by the co-operation of all team members.

In defining the concept of pedagogical work, it is important to understand the theoretical underpinnings that have historically influenced ECE practices and perspectives and according to which the general objectives of ECE are formed. Most of the perspectives on early childhood education are based on the

ecological theory by Bronfenbrenner (1979) and the socio-cultural theory by Vygotsky (1978). These theories have strongly influenced the view of how environmental factors affect the development of a child and how the child has been seen as a competent person who builds his/her knowledge of the world through social constructions based on interactions with others. The theories have thus reflected the construction of the educator's role and the practical implementation of pedagogy (Dahlberg, Moss & Pence, 1999).

A large corpus of works (Vandell & Wolfe, 2000; Sims, 2006; Sajaniemi et al., 2011; Suhonen, 2009; Sheridan, 2009) have highlighted the importance of high-quality early childhood education and demonstrated the positive impact that this has on children's cognitive and socio-emotional development and well-being (Vandell & Wolfe, 2000). Research on ECE quality has offered various explanations of factors that affect overall quality and of the actors involved at different socio-ecological levels (e.g. society, municipalities, ECPs, families). In this study the focus is on the pedagogical work that ECPs execute at the group level in kindergartens. The pedagogical work in kindergartens is, of course, affected, directly or indirectly, by numerous actors, but the present study's main interest is in the quality factors that are linked to pedagogical work and for which ECPs are responsible in their daily work. Generally, quality aspects in ECE service delivery have been categorised as structural and process factors (Bigras et al., 2010). Some pedagogical processes may be more significant in determining overall quality, but ultimately it is essential that both structural and process factors along with materials and other structural resources are utilized in an appropriate manner to create high quality ECE (Sheridan, 2009). Structural factors include adult to child ratios, qualifications of ECPs, group size and requirements for the physical environment. Process factors that are not easily measured or observed include aspects regarding appropriate pedagogical approaches and practices and quality of relationships. Overall, however, the studies agree that the quality of interaction between adults and children is fundamental in determining the quality of ECE. Studies have shown (NICHD, 1999; 2000) that meaningful learning and development occur in an environment characterised by positive affective interaction between the child and the adult.

Such a finding indicates that the interactional approach has been emphasized in current early childhood education. In an interactional approach pedagogical work lies in the notion of reciprocity, which means that sometimes the child can take the initiative and lead the action/play, and sometimes, the educator can take the lead. The main premise is that both educator and child are in tune with each other and share the same objective in action and joint attention (Bruce, 2011; Bruner, 1986). Interaction ensures the child's psychological well-being, and the ECP's competence plays a vital part in this process. Only with the right knowledge and skills to meet the needs of the child can qualified ECPs foster the child's social, emotional and cognitive development (Clarke-Stewart, Vandell,



Burchinal, O'Brien & McCartney, 2002; Philipsen, Burchinal, Howes & Cryer, 1997; NICHD, 1999; 2000). Indeed, studies have shown that the ECPs' level of education and competence affect the quality of their pedagogy (Fontaine, Torre, Grafwallner & Underhill, 2006; Sheridan, 2009), as better qualified professionals are more sensitive to acting responsively with children and to take their individual needs into account (Burchinal, Cryer, Clifford & Howes, 2002; Lamb, 2000; Vandell & Wolfe, 2000).

The concept of pedagogical sensitivity is at the core of pedagogical work. The more we know about the biological aspects of children's development and learning, the more ECPs are expected to recognise children's individual characteristics and developmental premises. Pedagogical sensitivity is defined as child-responsive pedagogy whereby teachers/caregivers recognise children's intentions and individuality, along with enriching their activity, by encouraging them to function at the upper limits of their current abilities (Suhonen & Sajaniemi, 2012; Sajaniemi, Suhonen, Nislin & Mäkelä, 2015). Pedagogically sensitive ECPs are responsive to children's initiatives and engage in positive interaction with the children. They also attenuate negative emotions and enhance positive ones (Laine & Neitola, 2002) and permit children's autonomy so that the children can present their ideas and come up with new experiments (Pascal et al., 1995). In addition, pedagogical sensitivity means sensitivity to group dynamics, which is not limited to educator-child dyads. According to Ahnert (2005), children tend to develop the same level of attachment to all educators in the same group as opposed to individual child-educator attachments. This means that pedagogical group sensitivity focuses on group-level interactions in which both children and ECPs have to respond to each other's initiatives in a group setting.

Teamwork in regular and special (integrated) kindergarten groups is multiprofessional work whereby teachers and special teachers are primarily responsible for pedagogy. Multiprofessional work is constituted in co-operation with various occupational groups (e.g. teachers, assistants and nursery nurses), whereby every member on the ECP's team shares his/her knowledge and works towards collectively defined targets. Especially in special education, professionals such as psychologists, speech therapists and occupational therapists are typical team collaborators. It is extremely important that there be pedagogically qualified staff in groups, especially since a number of studies have shown that the level of education and the competence of the staff are some of the main factors determining the quality of day care (Burchinal et al., 2002; Vandell & Wolfe, 2000; Suhonen, 2009).

Especially in the context of early childhood special education, pedagogical competence is extremely important. Early childhood special education is based on a pedagogical evaluation that identifies the child's strengths and weaknesses. The aim of early intervention is to intervene in developmental risks and

strengthen the child's existing capabilities. Pedagogical action is based on these notions and evaluations through an in-depth understanding of each individual child, the child's developmental niche and the strengths and opportunities available (Pihjala, 2006).

Thus, pedagogical work is conceptualised as the product, within a group context, of the totality of children's and adults' interactions and participation in learning; in a broad sense it is equivalent to a group learning culture. The aim of the work of ECPs is to secure children's chances of participation, learning and well-being. In this environment each actor affects other actors as in Bronfenbrenner's ecological theory (Bronfenbrenner 1979; 2005), creating feedback loops so that when children are happily engaged in learning opportunities provided by ECPs, ECPs' feelings of competence and work-related success are strengthened, and further enhancing the positivity of the pedagogical work.

### **2.3 Work-related well-being: balance between ECPs' work demands and resources**

Work in the field of ECE challenges ECPs in multiple ways. It requires quick decision making, adaptation to changes and proactive behaviour. Children's numerous needs for support require continuous evaluation and pedagogically sensitive actions from ECPs. Especially in integrated special kindergarten groups, children's special educational needs may vary greatly. Children may, for example, have difficulties in self-regulation or learning and have severe disabilities. Traumatized children with challenging family histories may burden ECPs emotionally. As mentioned previously, work in the field of ECE may be demanding, but at same time it may be rewarding and enhance work satisfaction and further improve overall well-being. A focus on the negative aspects that threaten well-being gives us a narrow picture of the state of educators' well-being, which being requires a balance between negative factors associated with stress and positive factors associated with engagement in work. In this thesis the job demand-resources model is applied as a theoretical model to analyse both the challenges and the positive factors encountered by ECPs at work. This widely-used model in occupational research assumes that in every occupation it is possible to divide psychosocial and physical working conditions into demands and resources (Bakker & Demerouti, 2012; Bakker, Demerouti & Verbeke, 2004). The job demands-resources model (hereafter JD-R model) (Bakker et al., 2004; Demerouti et al., 2001) describes the aspects of work that affect well-being by analysing the rewarding and demanding characteristics of the work. "Job demands" refers to work-related physical, psychological, social or organizational requirements faced by employees. Work resources, in turn, are the physical, psychological, social or organizational factors that contribute to the

achievement of work objectives, possibly reducing strain and supporting employees' growth, development and learning (Demerouti et al., 2001; Schaufeli & Bakker, 2004; Hakanen, 2009a). There are many diverse job demands in regular and special kindergarten groups. Children's challenging behaviour and deficiencies in the physical work environment (such as oversized groups, lack of space) can lead to a diminishment of resources and expose employees to exhaustion and health deterioration (Bakker et al., 2004; Demerouti et al., 2001; Hakanen, 2009a; Kinnunen & Salo, 1994). However, resources, such as social support, autonomy, and the trust of colleagues and supervisors help protect educators from strain and promote well-being. This, in turn, leads to internal work motivation and work engagement (Demerouti et al., 2001; Bakker & Demerouti, 2006). Several studies have also shown that the more that employees receive social support and experience emotional stability, the better is their work performance (Bakker, Demerouti, Hakanen & Xanthopoulou, 2007; Demerouti et al., 2001). The innovative nature of this approach lies in its combination of positive and negative well-being processes (Hakanen, 2004). In this study the model is applied to the multidimensional resources and work demands of early childhood education.

The JD-R model highlights the factors of work engagement as well as those that lead to burnout. The model assumes that work engagement and burnout are caused by two different types of energy paths (Prieto, Salanova, Martinez & Schaufeli, 2008). The positive energy path exemplifies a balance between job demands and resources (Schaufeli & Bakker, 2004; Hakanen, 2009a; Bakker, & Demerouti, 2006). Here, the work is not overly uncomplicated, nor do the challenges overburden the employee. The energy path that stems from job resources fosters the employee's professional growth and boosts job satisfaction (Schaufeli & Bakker, 2004).

Studies have demonstrated that the well-being of an employee is important to the entire working community. Motivated and engaged employees are better able to exploit their own resources and are more committed (Hakanen, 2009a). ECPs who are motivated and healthy perform better at work. This has a positive impact on the entire working community, as it enhances flourishing and effectiveness (Xanthopoulou, Bakker, Demerouti & Schaufeli, 2009). Limited resources and simultaneously unreasonably high demands may generate difficulty in adapting to stressful encounters by constricting the use of helpful strategies. This can lead to maladaptive coping processes, thereby increasing the risk of burnout and the number of health problems (Hakanen, 2009a). Stress and exhaustion develop when an employee continually feels stretched to the limit without support or time for recovery. An accumulation of demands leads to the depletion of energy resources, which finally leads to severe health problems (Hakanen, 2009a; Schaufeli, Bakker & van Rhenen, 2009) and requests for sick leave (Bakker et al., 2004).

### **2.3.1 Two sides of work: work engagement or burnout**

Everyone has experienced feeling exhausted by work and, every now and then, diminished motivation. This is usually temporary, and usually people find meaningfulness in work again. However, continuous problems relating to coping with stressful encounters at work can be described as burnout (Schaufeli, Leiter & Maslach, 2008). Stress, depression and burnout are overlapping concepts, and it is sometimes difficult to identify the symptoms. In stressful situations an employee seeks coping strategies intended to resolve the cause of conflict. Such efforts usually lead to a successful resolution of the stressful situation (Hakanen, 2009a). Serious burnout is intertwined with prolonged coping with the problems that precede maladaptive, powerless behaviour in confronting challenges. As in depression, common burnout symptoms include fatigue, difficulty concentrating and general loss of energy. Evidence appears to suggest that prolonged symptoms can lead to major episodes of depression (Hakanen, 2009a; Hakanen, Schaufeli & Ahola, 2008). Even if burnout appears to be linked to stress and depression, it maintains its distinction as a separate, work-induced problem (Hakanen, 2009a).

Maslach and her colleagues (Maslach, Jackson & Leiter, 1996; Maslach, Schaufeli & Leiter, 2001; Schaufeli, Leiter & Maslach, 2008) define burnout as a three-dimensional syndrome characterised by fatigue, cynicism and decreased professional self-esteem. Exhaustion is considered an emotional fatigue that measures feelings of being emotionally overextended and exhausted by one's work. Cynicism (or depersonalization) at work presents as joylessness and loss of work meaningfulness. An employee may regard his/her work half-heartedly, and attitudes to other colleagues may be negative or hostile. Cynicism implies that other people are treated as objects as opposed to real individuals (Kinnunen & Hättinen, 2008). In the field of education and child care, this attitude could be extremely harmful to those for whom the work is carried out, namely the children. Cynical attitudes towards ECE could be seen as insensitivity in interactions with children, less energy in developing one's own work and poor relationships with the children's families. ECPs with minimal interest in children would be extremely harmful, not only to the children, but also to the entire ECP team. Finally, the problem of coping at work may lead to a decline in professional self-esteem (Schaufeli, Leiter & Maslach, 2008). Reduced accomplishment (or inefficacy) reflects an employee's feelings of incompetence and lack of achievement at work (Maslach & Leiter, 2008).

Different definitions of burnout seem to be incompatible with the fact that, after all, burnout is triggered by failed attempts to cope in a positive way in emotionally demanding situations (Hakanen, Schaufeli & Ahola, 2008). Burnout results from an employee's inability to meet work demands (Schaufeli, Leiter, &

Maslach, 2008); if the situation is prolonged, it can lead to problems with coping and health.

It has been well documented that it is not possible to investigate well-being at work by focusing only on the absence of malaise or on coping problems (Hakanen, 2009a). Instead, it is essential to explore the employees' experiences in the resourceful and positive aspects of work. By utilising the framework of positive psychology, work-related well-being has been analysed through the concept of work engagement. Initially, work engagement was defined in the occupational research literature as employees' commitment to their work (Bakker & Leiter, 2010). Therefore, commitment and work engagement are very similar concepts; however, commitment also refers to the relationship between an employee and his/her organization. Work engagement thus reflects a personal and private relationship with work. Consequently, the positive effects of work engagement on productivity and efficiency have increasingly been recognised (Hakanen, 2009a).

According to the definition by Schaufeli and colleagues, work engagement is "a positive, fulfilling, work-related state of mind characterized by vigor, dedication and absorption" (Schaufeli et al., 2002). They point out that work engagement is a relatively stable and permanent state over time (Schaufeli, Bakker & Salanova, 2006). Vigour refers to the experience of energy, an employee's desire to make an effort to work and to persevere. Dedication ensues when an employee finds his/her own work meaningful, is excited and inspired by it and feels proud of his/her own work. Absorption reflects a person's perfect concentration on work, a perception that time goes by quickly and a reluctance to end tasks early (Schaufeli et al., 2002).

An employee who shows engagement with work probably regards his/her work as meaningful and is better able to cope with adversity or negative reversals on the job (Bakker & Leiter, 2010; Hakanen, 2009a; Hakanen, Perhoniemi & Toppinen-Tanner, 2008). Further, it has been shown that work engagement may reflect positively on employees' other life domains (Schaufeli & Bakker, 2004). Overall, work engagement leads to enjoyment and happiness in work (Bakker et al., 2008; Bakker & Leiter, 2010; Schaufeli et al., 2008; Hakanen, 2009a). In the context of early childhood education, work engagement among ECPs might also have an inverse relation to children's well-being; hence, work engagement is seen to be contagious among the members of a community. Children are not only the target of pedagogical work, but also are participants in the community together with the adult members.

## **2.4 Physiological measures of workplace stress and well-being**

Traditionally, work-related well-being and job satisfaction have been investigated mainly at the psychological level with self-report surveys as the data collecting method. However, recently more research has been conducted by combining both psychological and physiological characteristics relating to well-being. Studies have demonstrated relations between workers' psychological well-being and the function of their stress regulation system (see e.g. Chandola, Heraclides & Kumari, 2010; Danhof-Pont, van Veen & Zitman, 2011). A number of studies have examined work-related well-being using methods that measure the stability of the physiological stress regulation system. These studies have found close associations between the psychological well-being of white- and blue-collar workers and their stress regulation systems, associations that are simultaneously related to their work conditions (see Chandola, Heraclides & Kumari, 2010; Danhof-Pont, van Veen & Zitman, 2011). These results point to the usefulness of this measure in understanding workplace well-being in greater depth.

However, in the field of early childhood education, there is limited application of such an approach, and the literature on which such studies could be based is highly fragmented (Hall-Kenyon, Bullough, MacKay & Marshall, 2014). Moreover, physiological measures have not been used, with surveys, interviews and observations being the primary methods used in data collection (Hall-Kenyon et al., 2014). In the present thesis ECPs' well-being is investigated by combining the data on the function of their stress regulation with the data on their self-experienced working conditions. By combining both psychological and physiological aspects, we hope to gain a more comprehensive view of ECPs' well-being at work.

### **2.4.1 Salivary cortisol and alpha-amylase: biomarkers of stress**

Stress is a commonly used concept for describing the challenging and demanding nature of work and the problems in coping with it. On the psychological level it is true that demands at work may be seen as potential factors that cause stress, and if these demands became too burdensome and no recovery occurs, this may well lead to poor work well-being and result in distress, anxiety and emotional exhaustion (Hakanen, 2009a; Schaufeli, Bakker & van Rhenen, 2009). However, the concept of stress has also widened to describe all the challenging aspects of work that could be seen as motivating and vitalising factors with positive impacts on well-being. Challenging tasks could boost employee's motivation, and working at the upper limit of one's current abilities may offer new learning experiences and enhance engagement.

Likewise, on the physiological level stress is not necessarily a negative factor leading to deteriorating health. Small amounts of stress are actually needed for basic bodily functions (Porges, 1992; Sajaniemi, Suhonen, Nislin & Mäkelä, 2015). The fluctuation of stress hormones is constant, and stress hormone levels do not elevate suddenly in stressful situations only (Nicolson, 2008). Nevertheless, if work overload and challenges are chronic and constant, it may lead to dysregulation in the stress system and contribute to ill health and many somatic disorders (Bollini et al., 2004). Hence, it is necessary to make a distinction between chronic and short-term stress. Hans Selye (1950) described the multidimensional nature of stress by utilizing the concept of general adaptation syndrome (GAS). He pointed out that bodily functions emerging in the course of stressful events are universal and not necessarily indicators of pathologies or ill health. Instead, stress is an inevitable part of life, and activation of the stress regulation system is the organism's normal way of adapting to challenges and environmental changes. Balanced stress regulation is needed to secure adaptive and optimal functioning (Gunnar & Cheatham, 2003; Nicolson, 2008; Lupien, McEwen, Gunnar & Heim, 2009). An activated stress regulation system draws attention to the environment in order to identify potential threats. At the same time the system evaluates the elements that are signalling safety and shelter. Sudden changes in physical or social environments alert the stress regulation system, which in turn directs attention and shapes an appropriate reaction (Lupien, McEwen, Gunnar & Heim, 2009). This ultimately leads to recovery from the stressful situation (Gunnar & Quevedo, 2007). However, if coping does not succeed, this may lead to negative consequences such as exhaustion (Selye, 1950) and ill health (Nicolson, 2008). The human stress regulation system developed during evolution and the neural structures that are responsible for basic functions are ancient, having developed over hundreds of millions of years (Greenberg, Carr & Summers, 2002; Sajaniemi et al., 2015). Optimal functioning of the stress regulation system, which is in charge of basic stress responses – fight or flight or freeze, has guaranteed the survival of the human race (Sajaniemi et al., 2015).

Physiologically, two endocrine response systems are known to be activated by psychological stress: the sympathetic-adrenal-medullary (SAM) system and the hypothalamic-pituitary-adrenocortical axis (HPA) (Gunnar & Cheatham, 2003; Gunnar & Quevedo, 2007). The stressor-initiated endocrine response provides a key pathway to investigating physiological correlates with well-being and can be easily assessed by measuring stress hormones (cortisol and alpha-amylase) in saliva. These biomarker assays have long traditions, with free salivary cortisol measurements introduced in psychosomatic research in the 1980s as an easy, non-invasive and ecological way to obtain an objective measure of the activity of the HPA axis (Kirschbaum & Hellhammer, 1989; Hellhammer, Wüst & Kudielka, 2009). More recently, the activity and/or output

of salivary alpha-amylase (sAA), an enzyme in saliva, has been proposed as a new indirect marker of the autonomous nervous system activation (related to the SAM system) produced by stressful situations (Nater & Rohleder, 2009; Rohleder & Nater, 2009).

In response to stressors the SAM system acts very quickly. sAA increases during stress and is significantly and directly associated with changes in emotional states (Takai et al., 2004). sAA is directly related to norepinephrine (NE) activity through NE release from sympathetic nerves and stimulation of receptors on secretory cells in the salivary gland to produce sAA when the organism is under demand (Turner & Sugiya, 2002). sAA varies directly with levels of NE (Rohleder et al., 2004). Activation of the SAM system is succeeded by HPA activation, and the stress hormone cortisol is the main product of its activation (Kirschbaum & Hellhammer, 1989). The activation of the HPA system operates to mobilise the organisms' resources through up-regulation of the stress hormone, cortisol, to meet challenges as needed. Conversely, the system down-regulates cortisol through a negative feedback loop when the challenge has been met (Gunnar & Quevedo, 2007; Bollini et al., 2004). SAM activation prepares for fight or flight responses, mobilising the body to manage challenges and threats (Chrousos, 2009; Sapolsky, 2000). Cortisol, the primary effector of HPA activation in humans, affects brain functions associated with memory, learning and regulation of emotional states. In essence, stress responses are necessary and vitalising. The boosting effects of the stressor-elicited activation can be achieved only when the SAM and HPA functions are balanced. (Sajaniemi et al., 2015)

#### **2.4.2 Work and stress regulation**

Work-related responsibilities and tasks activate the stress regulation system in various ways. Individuals differ in their stress responsivity; some people may be more sensitive and more easily physiologically stressed than others (Langelaan et al., 2006). Activation of the HPA system is required for optimal cognitive performance and adaptive behaviour when encountering challenges, such as those occurring in the workplace. However, if employees experience chronic stress, the secretion of cortisol may be disturbed and negatively affect brain functions and behaviour (Groenvelde, Vermeer, van Ijzendoorn & Linting, 2012; Dmitrieva, Almeida, Dmitrieva, Loken & Pieper, 2013). Prolonged, overwhelming and repeated activation of the both SAM and HPA systems interferes with the control of physiological systems, resulting in various emotional and physiological stress-related dysfunctions (Groenvelde et al., 2012; Dmitrieva et al., 2013). There are individual differences in cortisol (Stone et al., 2001; Adam & Gunnar, 2001) and alpha-amylase secretion (Granger et al.,



2007), but studies have confirmed that the fluctuation of cortisol follows certain circadian rhythms (Dmitrieva et al., 2013) that are asymmetrical with the daily pattern of alpha-amylase (Granger et al., 2007). These patterns of cortisol and alpha-amylase secretion are reasonably well established for usual human functioning (Nicolson, 2008).

Studies have shown that employees who reported greater work overload had higher levels of cortisol on waking (De Vente, Olf, van Amsterdam, Kamphuis & Emmelkamp, 2003; Schultz, Kirschbaum, Pruessner & Hellhammer, 1998; Steptoe, Copley, Griffith & Kirschbaum, 2000), while higher evening values are also connected with stress symptoms (Morgan, Cho, Hazlett, Coric & Morgan, 2005). Although studies have produced conflicting results regarding the relationship between cortisol and work overload (Chandola, Heraclides & Kumari, 2010), it seems that the greater the number of job stressors, the higher the cortisol awakening response (CAR) (Chida & Steptoe, 2009). Studies relating to sAA activity and work-related well-being are scarce, although a reduction in sAA activity levels has been reported after a stress management intervention with lower or middle management employees (Limm et al., 2011). Furthermore, it has been found that combining SAM and HPA information might be a better marker for stress-related conditions than either marker alone (Ali & Pruessner, 2012; Hidalgo et al., 2014; El-Sheikh, Erath, Buckhalt, Granger & Mize, 2008). At present, a growing number of investigations utilize sAA and cortisol measures together as indicators of stress responses regulation.

### **2.4.3. Ratios of salivary alpha-amylase and cortisol: a unique method for analysing stress regulation**

The technical possibility of analysing salivary cortisol and sAA activity and/or output in the same saliva sample in a non-invasive and relatively inexpensive manner originated in a study of the psychological and physiological significance of salivary cortisol/sAA and sAA/salivary cortisol ratios (Ali & Pruessner, 2012; Bauer & Boyce, 2002; Hidalgo et al., 2014). The combination of these measurements in a unique ratio value (e.g. cortisol/AA or, alternatively, AA/cortisol) is thought to be a better marker of chronic stress or mood disorder (such as anxiety, depression or burnout) than cortisol or sAA levels alone (Ali & Pruessner, 2012; Hidalgo et al., 2014; El-Sheikh et al., 2008). Ali and Pruessner (2012) have shown, for example, in an experimental sample of adolescents suffering a history of early life adversities that the reactivity of the sAA/cortisol ratio to the Trier Social Stress Test (TSST) is a better marker of chronic stress and depression than the cortisol/sAA ratio or the cortisol or sAA activity levels alone. This result is consistent with the asymmetry of the norepinephrine to

cortisol levels observed between PTSD patients compared with other psychiatric groups (Mason et al., 1988).

Similar results have also been observed at lower chronological ages (Fortunato et al., 2010). Nevertheless, the exact physiological and psychological meaning of the co-ordinated or asymmetrical actions represented by these ratios is still under debate due to the scarcity of data (Ali & Pruessner, 2012). As far as I am aware, no data were published during the work on the present thesis with regard to possible changes in these ratios in relation to work engagement and burnout.

Previous studies using cortisol as a biomarker of stress have tended to be pathologically orientated instead of directed at normative samples. Furthermore, studies emphasizing positive aspects of work are scarce. In this thesis, the purpose is to determine the function of ECPs' stress regulation system in natural conditions, that is, at work and at home, instead of in laboratory settings. Because there is a lack of research on positive work-related emotions and physiological changes in stress regulation, the goal here is to investigate possible associations between stress regulation and work engagement. The usefulness of different stress biomarkers, especially the ratio values of salivary cortisol and alpha-amylase in determining the function of stress regulation, are also explored. In addition, the novelty of the thesis study design is to investigate the extent to which stress regulation, work engagement and burnout are associated with ECPs' performance at work. This approach using both stress biomarkers (cortisol and  $\alpha$ -amylase) to investigate the association between stress regulation, experienced work engagement and job performance is unique.

### 3 The aim of the study

The general aim of this thesis is to investigate early childhood professionals' stress regulation, work-related well-being and pedagogical work in kindergartens and explore the extent to which these factors are associated. In this thesis ECPs' experienced job demands and resources are analysed in order to enhance our understanding of the nature of the challenges involved in work that is simultaneously demanding and rewarding. Additionally, work engagement and possible burnout symptoms are under investigation for how they illuminate positive and/or negative emotional affects associated with ECE. Secondly, the focus is on physiological aspects relating to stress regulation and its relation to workplace stress and ECP's job performance, in particular the quality of the pedagogical work. The combined use of the biomarkers salivary cortisol and alpha-amylase is a novel approach in endocrinological research. Moreover, combining physiological data with participants' self-experienced work-related well-being gives us a multidimensional perspective on the state of ECE professionals' well-being, adding significantly to the literature on this subject. In addition, the context of this study, namely the ECPs' work environment, is of great importance; the unique stressors experienced in the workplace coupled with the significance of the work undertaken by ECPs means that enhancing understanding of ECP workplace well-being has an impact not just on the workers themselves, but also on children, the future citizens of the world.

With this multidisciplinary, integrative approach together with the use of multiple methodologies, the aim is to enhance knowledge of working life in the field of early childhood education. This thesis consists of three studies that form a coherent whole. The general aims of each study are described below, and the study design is presented in Table 1. Study I endeavours to answer questions 1 and 2; questions 3 and 4 are answered with the data used in Study II. Finally, question 5 is based on Study III.

The aim of *Study 1* was to investigate the extent to which ECPs in regular kindergarten groups experience the demands and resources of their job and determine how these relate to stress regulation and the quality of the pedagogical practice.

**Q1: How do ECPs experience their work demands and resources and to what extent are these related to the ECPs' stress regulation?**

H1: Work demands and resources that ECPs encounter at work will be associated with their stress regulation. The hypothesis is that a symmetrical pattern indicates optimal cortisol activity related to balanced job demands and

resources. In contrast, higher levels of cortisol in the morning or atypical variations in diurnal cortisol activity relate to perceived greater job demands.

**Q2: How are perceived job demands and resources and stress regulation associated with the ECPs' job performance in terms of quality of pedagogical work?**

H2: In teams where the resources are experienced as adequate and demands are fewer, the quality of the pedagogical work is higher. Conversely, in teams where the ECPs experience the work as demanding and have fewer available resources, the quality of pedagogical work is lower.

The principal concern in *Study II* was to investigate the potential usefulness of a combination of multiple methodologies in studying stress regulation and well-being in early childhood education professionals at work.

**Q3: What is the usefulness of using salivary cortisol, salivary alpha-amylase and their ratios as indicators of the functioning of ECPs' stress regulation systems during the working day and on weekend days?**

H3: The hypothesis is that ECPs' stress regulation system is alert on working days and more balanced on the weekend. This situation is seen in a more balanced ratio of cortisol and alpha-amylase during the weekend compared to ratio values on a working day. This means higher cortisol over alpha-amylase ratios during the weekend and the opposite during the working day.

**Q4: What are the relations between experienced work engagement, burnout and the biomarkers of stress?**

H4: ECPs who demonstrate more balanced stress regulation are more likely to experience higher levels of work engagement and fewer symptoms of burnout. This manifests during both the working day and the weekend days as more balanced regulation and higher self-reported work engagement and fewer symptoms of burnout.

In *Study III* the aim was to investigate further the relationship between ECPs' stress regulation (using the biological measures cortisol and alpha-amylase), work engagement and the quality of the pedagogical work in an attempt to enhance understanding of the factors affecting the quality of pedagogy and well-being at work.

**Q5: How are ECPs' stress regulation, work engagement and quality of pedagogical work associated?**

H5: ECPs who experience high levels of work engagement are more balanced in their stress regulation. Further, in teams where ECPs are engaged in work and their stress regulation is balanced, the quality of ECE is higher.

Table 1. Overview of the study design

<b>Article</b>	<b>I Work Demands and Resources, Stress Regulation and Quality of Pedagogical Work Among Professionals in Finnish Early Childhood Education Settings</b>	<b>II Occupational Well-being and Stress among Early Childhood Professionals: the use of an innovative strategy to measure stress reactivity in the workplace</b>	<b>III Pedagogical Work, Stress Regulation and Work-related Well-being among Early Childhood Professionals in Integrated Special Day-care Groups</b>
<b>Journal</b>	<i>Journal of Early Childhood Education Research</i>	<i>Open Review of Educational Research</i>	<i>European Journal of Special Needs Education</i>
<b>Published</b>	2015	2016	2015
<b>Data</b>	Survey data, salivary cortisol measures and observational assessments collected in 2009	Survey data, salivary cortisol and alpha-amylase measures collected in 2012	Survey data, salivary cortisol and alpha-amylase measures and observation data collected in 2012
<b>Participants</b>	Early childhood professionals (n=117) in regular (n=28) and integrated (n=6) kindergarten groups in the greater Helsinki metropolitan region	Early childhood professionals (n=89) from 21 integrated special kindergarten groups in the city of Helsinki	Early childhood professionals (n=89) from 21 integrated special kindergarten groups in the city of Helsinki
<b>Data analysis</b>	Kruskall-Wallis, Mann-Whitney, structural equation modelling (SEM)	Student t-test, ANOVA, Mann-Whitney, Kruskall-Wallis	Pearson correlation coefficient (r)



## 4 Methods

Ethical approvals for the research were obtained from the Ethics Committee on Human Studies of the University of Helsinki. In conducting the research and reporting the results, statements of ethically acceptable and reliable research practices were followed. Research consent was received from the participants and the cities, which participated in the study. The ECPs understood that they were part of a research project and that their privacy would be maintained. Participation in the study was voluntary, and the participants were made aware of their freedom to withdraw at any time. Collection of salivary cortisol and alpha-amylase samples did not cause the participants any pain or discomfort, and in the event of any suspicion of illness, there was an opportunity for a medical consultation at the Finnish Department of Occupational Health (FIOH) and a further offer of consultation for the participants.

### 4.1. Participants and procedure

The data for the study were collected in two separate phases (in 2009 and in 2012) and from two different study populations. Studies I, II and III are independent, but form a coherent entity of the phenomenon under research. The aim was to investigate ECP's well-being and work in both regular groups and integrated special groups to gain a broad perspective on multidimensional work in early childhood education settings.

Study I formed part of the LASSO (Children Stress Regulation and Learning) research project at the University of Helsinki's Department of Teacher Education (Early childhood education section). For my parts of the larger study, data were collected in February-March 2009 from kindergartens in the greater Helsinki metropolitan region that were already participating in another intervention study by our research group. All kindergartens in the areas ( $n = 80$ ) had the chance to participate voluntarily. Twenty-four kindergartens provided research consent, together with 117 ECPs. The kindergartens were located in socio-economic middle-class areas. The study involved regular kindergarten groups ( $n = 28$ ) and integrated special groups ( $n = 6$ ) catering to children ages three to six. Child-adult ratios were 7:1 for regular kindergarten groups and 4:1 for integrated special groups as required by legislation at that time, and ECE teams consisted of a range of professionals, including teachers, special teachers, nursery nurses and assistants. The job title refers to each professional's specific area of responsibility during the data collection period. ECPs ranged in age from 21 to 60 ( $M = 42.7$ ,  $SD = 10$ ), and 97 per cent were female – numbers in line with the overall gender ratio in early childhood education (as identified by

Taguma, Litjens & Makowiecki, 2012), and 89.2 per cent were qualified to work in early childhood education settings.

The data for Studies II and III were collected between February and May 2012, and the studies are part of a longitudinal research programme on children's learning and development in early childhood special education settings operating in the Department of Teacher Education (the Special Education and the Early Childhood education sections) at the University of Helsinki. This study population consisted of 89 early childhood professionals (ECPs) from 21 integrated special day-care groups in Helsinki, Finland, selected from the longitudinal study. The groups in which the ECPs worked consisted of three- to six-year-old children with diverse special educational needs (SEN), which included specific language impairments, challenges in self-regulation skills and severe disabilities. Each integrated special education group consisted of seven support children (children who were developing typically) and five SEN children. The educator-child ratios in these groups were 4:1, and the staff members worked together as a team. The ECP teams were multiprofessional with two special education teachers, one nursery nurse, and one assistant making up the four required adult positions. The ECPs were between 21 and 63 years of age ( $M = 44.5$ ;  $SD = 10.5$ ). The background characteristics of the educators are presented in Table 1. There were some missing age values among the teachers ( $N=1$ ), missing educational background among the nurses ( $N=1$ ) and assistants ( $N=3$ ), and missing periods of employment among the nurses ( $N=1$ ). The missing values were not imputed.

## 4.2. Measures

The measures used in the three studies are presented in Table 1, which illustrates more clearly the structure of Studies I, II and III. Below the construction of the instruments is described in more detail.

### *Measures of ECPs' satisfaction with work*

In Study I early childhood professional well-being was assessed using surveys, specifically the **Day-care Barometer Survey** [2002] coupled with a questionnaire to collect demographic information and information on demands and resources at work. The demographic information covered such matters as age, education level, occupation and health-related questions. The survey included twenty items from the Educational Barometer Survey (2002) developed by the Centre for Educational Assessment (the University of Helsinki). The



twenty items formed four scales: emotional pressure, social support, supervisor<sup>4</sup> support and job autonomy, which were drawn from the Job Demands and Resources model (Bakker & Demerouti, 2006; 2012). Participants were asked to rate their work and working environment (demands and resources) using a five-point Likert scale (1 = never, 5 = very often). These items formed four different subscales, which are presented in the list below along with the relevant reliability estimates (Cronbach's alpha and Pearson's  $r$ ):

1. Emotional pressure (ten items) contained items that considered exhaustion and socio-emotional challenges encountered at work. (.92)
2. Social support (six items) considered issues such as a supportive work environment, collegial discussion and positive feedback. (.83)
3. Supervisor support (two items) referred to social support from supervisors. ( $r=.64$ )
4. Autonomy (two items) related to ECE professionals' experiences of affecting their own work and courses of action. ( $r=.51$ )

**The Utrecht Work Engagement Scale (UWES;** Hakanen, 2009b) was used in Studies II and III to measure the ECPs' experiences of the motivating and encouraging aspects of their work. This scale was based on a three-dimensional structure of work engagement and consisted of 17 questions, which measured the following:

1. Vigour: e.g. "When I get up in the morning, I feel like going to work." (6 items in total)
2. Dedication: e.g. "I am enthusiastic about my work." (5 items in total)
3. Absorption: e.g. "I feel happy when I am working intensely." (6 items in total)

The answers were rated on a seven-point scale (0=never, 6=every day, 7=I can't say). The psychometric properties of the UWES questionnaire proved to be high (Seppälä et al., 2009). Three sum variables (vigour, dedication and absorption) were calculated based on the factorial structure of the questionnaire. Reliability analyses (Cronbach's  $\alpha$ ) for the scales vigour, dedication and absorption were conducted. The results showed good internal consistency ranging between .70-.86.

**The Maslach Burnout Inventory (MBI-GS)** was also included in Studies II and III and used to assess burnout. A standardised survey, the MBI-GS is widely used in occupational well-being research (Maslach et al., 2001). The psychometric properties and structural validity of the inventory has been widely confirmed (Schutte, Toppinen, Kalimo & Schaufeli, 2000). The inventory is

---

<sup>4</sup> In this thesis, the term supervisor describes the person who works as a director in a kindergarten.

based on the three factorial structures of burnout, i.e., emotional exhaustion, depersonalization and reduced professional self-esteem (Maslach et al., 2001; Maslach, Jackson & Leiter, 1996).

1. Emotional exhaustion (5 items) is a core element of burnout and represents the extent to which an employee feels overextended and unable to cope.
2. Depersonalization (5 items) reflects negative attitudes and responses to other persons (children, colleagues, parents, etc.).
3. Reduced professional accomplishment (6 items) assesses an employee's feelings of reduced competence and achievements at work.

The answers were rated on a seven-point scale, ranging from "0=never" to "6=daily". Reliability (Cronbach's  $\alpha$ ) of the scales emotional exhaustion, depersonalization and reduced professional accomplishment was calculated, and results showed good internal consistency ranging between .78-.82.

### *Measure of pedagogical work in ECE*

The quality of pedagogical work was evaluated in Studies I and III by using the **Learning Environment Assessment Scale (LEANS)**; Strain & Joseph, 2004). The scale was originally developed for the purpose of improving classroom quality for children with special educational needs. The scale is based on the principle that every child should benefit from the same pedagogical improvements; hence, the same factors are relevant in regular education groups. LEANS requires a trained observer to spend time to complete the rating. In Study I the scale assessed quality on a three-point scale (1=lowest – 3=highest), while in Study III a five-point scale (1=lowest – 5=highest) was used. The difference in scales was due to the fact that the instrument had been developed to be more sensitive in detecting quality differences. The scale assessed quality across a number of dimensions:

1. Classroom arrangements (10 items): organization of learning activities, quality of learning materials.
2. Schedules and transitions (11 items): ECPs' sensitivity in supervising children in transition, and the stability and predictability of the daily schedules.
3. Classroom activities (11 items): the utilization of pedagogical decisions; for example, the use of small working groups when appropriate.
4. Teamwork (8 items): ECPs' co-operation, a shared philosophy guiding the work.
5. Behaviour plans (6 items): pedagogical evaluations, the documentation and follow-up of the children's development and learning.

In the classroom arrangements the focus was on how the ECPs arranged the environment to promote learning, including the materials available to the children and whether they were appropriate for all skill levels. In essence, classroom arrangements reflected the physical aspects of the learning environment and how the ECPs had organized it. Schedules and transitions indicated such things as the stability and predictability of the schedules during the day and the ECPs' sensitivity in supervising the children. Classroom activities focused on the ECPs' practices in supervising children during different activities and how the ECPs modified the composition of the larger group when small group work was required. Teamwork involved items measuring such factors as the teachers' co-operation, the integration of individualized goals into daily activities and the ECPs' shared classroom philosophy, while behaviour plans pointed to specific strategies, observations and documentation of the children's development shared by the ECPs in team meetings. Internal consistency (Cronbach's  $\alpha$ ) of all the sum variables was tested; the results showed that there was good internal consistency, ranging between .67 and .81.

In Study I on regular groups, the observers (n=7) were employed as consultative special teachers in the day-care area and undertook observations for the study during their visits to the kindergartens. In Studies II and III a total of 9 consultative special teachers conducted the assessments. Consultative special teachers visited with the groups on three separate occasions for a comprehensive overview; they observed the quality of the learning environment by focusing on the physical, social and emotional characteristics of the classroom. Training was provided in the use of the rating scale prior to the observations.

### *Measures of ECPs' stress regulation*

ECPs' stress regulation was measured by using **salivary cortisol and alpha-amylase** as biomarkers of stress. Taking account of the diurnal fluctuation of cortisol levels in humans, we collected five samples from each subject using a procedure adopted in previous studies (see Sajaniemi et al., 2011; 2012; 2014). In Study I the samples were collected during one working day, while in Studies II and III they were collected during one working day and on one weekend day. All participants were given written instructions for taking saliva samples, and all were advised not to drink, eat or smoke 15 minutes before the samples were collected. They were also asked to report medication intake and chronic illness on the saliva collection days; we were able to confirm that there was no use of prolonged medication that would distort the results. The timing of collection could also be checked, as the participants wrote down the time of each measurement point on their samples.

Samples were collected at the following times: (1) on waking up; (2) half an hour after waking; (3) an hour after waking; (4) in the afternoon between 14:00 and 15:00; and (5) before going to sleep. Samples 1, 2, 3 and 5 were taken at home, and sample 4, at work. The participants mouthed two-inch cotton swabs until wet; these were then placed in Salivette tubes (produced by Sarstedt, in Nümbrecht) according to written instructions. The wet swabs were placed in Salivette tubes and stored immediately in a refrigerator before being delivered to the laboratory of the Finnish Institute of Occupational Health (FIOH) in Helsinki, where the saliva was separated from the cotton swab by centrifugation (1000g for 5 minutes) and stored at  $-20^{\circ}\text{C}$  until analysis using a chemiluminescence immunoassay LIA kit (LIA, IBL, Hamburg, Germany) with a measurement range of 0.43–110 nmol/l. Salivary  $\alpha$ -amylase activity was analysed with a Salivary  $\alpha$ -Amylase Assay kit (Salimetrics). The kit is specifically designed and validated for the kinetic measurement of salivary  $\alpha$ -amylase activity. The method utilizes a chromagenic substrate linked with maltotriose. The enzymatic action of  $\alpha$ -amylase on this substrate yields 2-chloro-*p*-nitrophenol, which can be measured at 405nm. The amount of  $\alpha$ -amylase reactivity present in the sample is directly proportional to the increase in absorbance at 405nm. The Coefficient of Variation percentage of Intra-assay is 2.5 to 7.2 per cent and the inter-assay is 3.6 to 5.8 per cent depending on concentration. The laboratory at FIOH was also responsible for verification of the validity of the measurements.

### 4.3. Analyses

All the analyses were conducted by using the SPSS IBM 22 and Amos 20.2 Software. The laboratory at FIOH was responsible for the analysis of free salivary cortisol and alpha-amylase (sAA) activity, including the verification of the validity of the measurements. The statistical analyses for the biomarker variables (cortisol and sAA) were partly uniform across the studies; for example, the basic variable transformations and analyses were similar in Studies I, II and III. However, in Study I salivary cortisol samples were collected only during one day, and the sAA was not analysed in this study design. In Studies II and III the data relating the biomarkers were the same (both cortisol and sAA), but the analyses were differed in part, because Study II was more focused on the usefulness of the ratios of salivary cortisol and sAA in determining the changes in stress regulation during working and weekend days. In Study III multiple biomarker variables were used. To illustrate the analyses used, the analysis protocol in Studies I, II and III is presented in Table 1. The analyses are described in more detail below.

**Study I:** To answer the questions (Q1 and Q2) in Study I, descriptive statistics were first obtained for the job demands and resources variables, salivary cortisol measures and pedagogical work. To investigate differences between groupings, such as the professions of kindergarten teachers, nursery nurses, assistants and special teachers, a Kruskal-Wallis test was conducted along with Mann-Whitney U-tests with Bonferroni correction (dividing p alpha levels by a number of conducted comparisons). Cortisol measures were highly peaked and positively skewed because of the outliers and extreme values in the data. To avoid the violation of test assumptions caused by the skewness, we inspected all cortisol values for outliers, which we converted to be equal to the most extreme values (ranging between  $-4$  SD and  $+4$  SD from the mean values) measured in a process recommended by Nicolson (2008). Missing values were computed with the EM algorithm in cases where there were only two values missing in a series, and the area under the curve (AUCg) was computed to measure the overall diurnal level of cortisol. AUC is a widely used method for detecting changes in physiological and endocrinological variables measured at different points over time, in this case during the working day (see Pruessener, Kirschbaum, Meinlschmid & Hellhammer, 2003). Further, participants' AUCg values were put into three groups using Z-values (low =  $-1$  Z-value, moderate and high =  $+1$  Z-value) to illustrate different profiles. In addition, correlation analyses (Pearson's) were conducted to test the connections between cortisol levels, job demands and resources and pedagogical work, and we analysed the daily trajectories of the raw cortisol values (morning, afternoon and evening) as well as how these related to the ECPs' background characteristics. The perceived teamwork of day-care personnel was analysed by means of the latent growth curve model (LGM) on the construct level, using structural equation modelling (SEM) techniques (Byrne, 2010). The sum variables<sup>5</sup> of pedagogical work were calculated according to the instructions for the LEANS scale. Descriptive statistics (minimum, maximum, mean and SD) for the dimensions of the pedagogical work was obtained to describe the quality of the work.

**Study II:** In Study II the salivary cortisol and sAA variables were transformed as identified in Study I. Further, to obtain the total diurnal response of the salivary cortisol and sAA activity, the area under the curve with respect to the ground (AUCg) was calculated using the same trapezoid formula (Pruessner, Kirschbaum, Meinlschmid & Hellhammer 2003) as used in Study I. Then, to demonstrate the variation in sAA activity levels after corrections for variations in cortisol, the AUC of the sAA activity was divided by the AUC of the free cortisol to derive an overall ratio variable (AOC) (Ali & Pruessner, 2012). The same ratio variable for cortisol (COA) was calculated by dividing the AUC of

---

<sup>5</sup> Classroom arrangements, Schedules and transitions, Classroom activities, Teamwork, Behaviour plans.

the salivary cortisol by the AUC of the sAA activity; this variable demonstrated the variations in cortisol levels when the variation in sAA activity was corrected.

The student's t-test for paired data was used to compare the ratio values of salivary cortisol over sAA activity (COA) and sAA activity over cortisol (AOC) on the working day and the weekend day. The ECPs' scores for burnout and work engagement were ranked according to the cut-off scores in the MBI-GS and the UWES manuals to illustrate the deviations among participants. Additionally, we used ECPs' age, period of employment and profession as grouping variables in comparisons between ECPs' characteristics and experienced work engagement and burnout. If the test assumptions for the parametric test (ANOVA) could not be verified due to the small sample size, we used the Mann-Whitney U-test or the Kruskal-Wallis test for comparison. In addition, correlation analyses were conducted to test the correlations between salivary cortisol and sAA activity and work engagement and burnout.

**Study III:** In Study III, first detailed descriptive statistics for socio-demographic variables related to the ECPs' characteristics (e.g. age, qualifications, educational background and illnesses) were obtained. These variables were used in correlational analysis (Pearson's product-moment correlation coefficients) with biomarker data to explore their potential associations. Second, in order to investigate the ECPs' stress regulation and determine the best possible biomarker related to the pedagogical work, the sum variables (calculated according to multiple measures derived from salivary cortisol and sAA values) were used. To demonstrate the overall output of the biomarker variables, the area under the curve was calculated as in Studies I and II. Additionally, several salivary cortisol and alpha-amylase variables were calculated as follows:

1. the delta cortisol (defining the volume of the morning peak, derived from values +30 minutes after waking minus the waking cortisol value);
2. cortisol (CAR) and sAA (sAAar) waking response (derived from morning values between 1) on waking, 2) +30 minutes, and 3) one hour after waking);
3. diurnal AUC (derived from the values between the measures 3 to 5)
4. ratio values of salivary cortisol over alpha-amylase (COA); and the ratio of alpha-amylase over cortisol (AOC) as calculated in Study II.

Finally, to investigate the relations between work engagement, stress regulation and pedagogical work, correlational analyses (Pearson's product-moment correlation coefficients) were conducted.

## 5 Main findings

The main findings are gathered from the original studies and presented in order of the study questions. Questions 1 and 2 are answered with the results of Study I. Studies II and III, which involve questions 3 to 5, are partly overlapping; hence, the results of the sub-studies are presented together and without dividing the results of separate studies into individual sections.

### 5.1. ECPs' job demands and resources and their associations with cortisol activity and pedagogical work

The results of Study I indicated that, in the ECPs' experience, their workplace resources were adequate, and on average their stress regulation was balanced. There were positive associations between pedagogical work and experienced job resources; additionally, there was an inverse relationship between pedagogical work and the ECPs' daily cortisol levels. Work was experienced as largely autonomous, and participants reported they had some degree of control over the content of their work and were able to decide the work to be carried out.

There were statistically significant differences between occupational groups (kindergarten teachers, special teachers, nurses, assistants) in perceived degrees of autonomy ( $\chi^2(3) = 14, 3, p = .003$ ). A post-hoc test using the Mann-Whitney test with Bonferroni correction ( $.05 / 4 = .0125$ ) was conducted to establish which of the groups differed significantly, and these identified a difference between kindergarten teachers and nurses  $U(3) = 169, p < .01$  and between special teachers and assistants  $U(3) = 31.5, p < .01$ ; nurses and assistants experienced more autonomy. The professions did not differ from each other in any other dimensions of job demands and resources.

Overall, social support appeared to be one of the main resourceful features of the work. The results indicated that the ECPs had a largely positive relationship with their supervisor; ECPs generally got along well with their supervisors and felt that their supervisors appreciated them. Further, the extent to which ECPs experienced emotional pressure in their work was explored. Overall, ECPs did not consider their work particularly demanding emotionally. Nevertheless, there were ECPs who found the opposite to be true and who stated that their work was emotionally challenging. The results of job demands and resources are presented in Table 2.

**Table 2. Descriptive statistics for job demands and resources among ECPs in regular kindergarten groups.**

Measure	Total		Teacher		STeacher		Nurse		Assistant	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Autonomy	3.3	0.8	3.1	0.8	2.7	0.7	3.6	0.6	3.5	0.8
Emotional Pressure	2.6	0.7	2.6	0.8	2.5	0.6	2.5	0.7	2.5	0.7
Supervisor Support	4.1	0.8	3.9	0.9	4.2	0.6	4.2	0.9	4.2	0.5
Social Support	4	0.5	3.9	0.6	4.2	0.4	4.1	0.7	4	0.5
N	73		30		9		20		13	

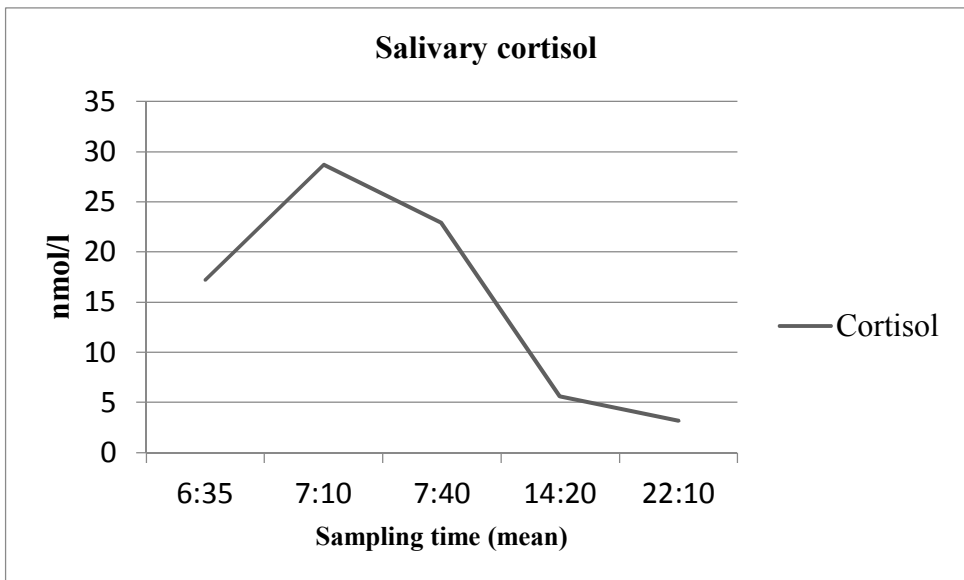
Supervisor support correlated negatively with emotional pressure ( $r = -.28, p < .05$ ). Additionally, supervisor support was positively associated with social support from colleagues ( $r = .3, p < .01$ ), whilst the autonomy reported by ECPs was related negatively with emotional pressure ( $r = -.63, p < .01$ ).

In regular kindergarten groups the overall mean score for pedagogical work assessed with the LEANS instrument was 2.4 on a 3-point scale indicating generally high quality across all five factors measured ( $M = 2.4, SD = 0.26$ ). On average the quality of classroom management was lower than other quality measures, and classroom activities demonstrated the highest level of quality. Table 3 in the original study shows the descriptions of the quality assessment (see Study I). In the mean scores of the groups the ranges between minimum and maximum values shown there indicates a remarkable variation within each scale. This show that even though the quality was good on average, it was not stable nor was it uniformly high across the regular kindergarten groups.

On average the ECPs' cortisol patterns were symmetrical and typical (see the Figure 1), and ECPs' patterns did not differ according to any background characteristics (e.g. age, profession). Participants' AUC values were grouped

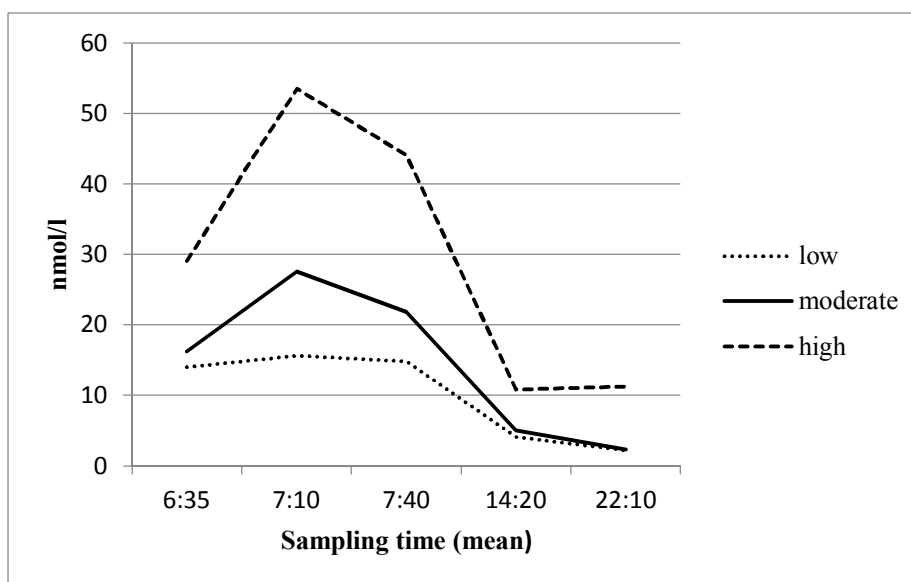


into three groups using Z-values to illustrate different profiles. Participants were grouped in three groups according to their cortisol reactivity – low (-1 Z-value), moderate, and high (+ 1 Z-value) – to detect atypical diurnal patterns that might indicate unstable stress regulation. Descriptive statistics for the full sample and low, moderate and high AUCg-value groups and pair-wise comparisons between different groups at different measurement points are presented in the original study (see Study I, Table 2).



**Figure 1.** ECPs' average diurnal salivary cortisol (nmol/l) pattern.

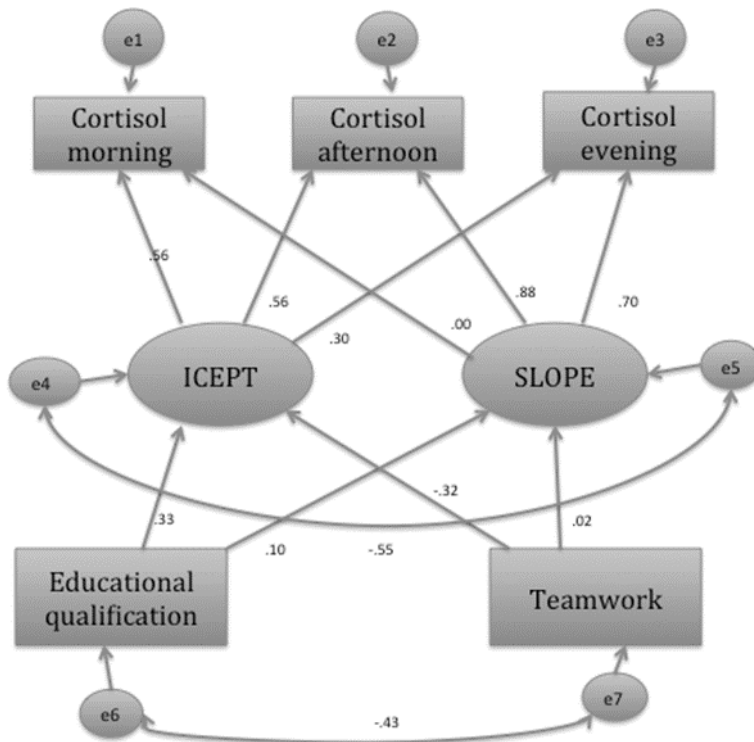
The AUC values were compared to separate measurement points. The Low ECP group ( $n = 8$ ) showed a flat diurnal pattern; their morning peak after waking was weak, and the values remained low throughout the day. Interestingly, cortisol levels of the High ECP group increased rather than decreased in the evening ( $n = 10$ ), and their values were significantly higher at every measurement point. The difference in cortisol values between groups was statistically significant at every measurement point (1.  $\chi^2 (2) = 8, 3, p=.02$ , 2.  $\chi^2 (2)=28, 7, p<.001$ , 3.  $\chi^2 (2)=37, 7, p<.001$ , 4.  $\chi^2 (2)=27, 8, p<.001$ , 5  $\chi^2 (2)=26, 4, p<.001$ ). Profiles are presented in Figure 2 and pair-wise comparisons are presented in the original study (see Study I). The Kruskal-Wallis test was conducted to determine whether the low, moderate and high AUCg groups differed in experienced job demands and resources, but there were no statistically significant variations ( $p>.05$ ).



**Figure 2.** ECPs' cortisol levels in five measurement points grouped in to low, moderate and high groups based on AUCg values (nmol/l)

Emotional pressure was negatively correlated with the quality of teamwork ( $r = -.25$ ,  $p < .05$ ), classroom activities ( $r = -.24$ ,  $p < .05$ ) and behaviour plans ( $r = -.32$ ,  $p < .05$ ). Supervisor support was positively related to the quality of teamwork ( $r = .23$ ,  $p < .05$ ), classroom activities ( $r = .27$ ,  $p < .05$ ) and behaviour plans ( $r = .34$ ,  $p < .05$ ). In addition, autonomy was associated positively with the quality of classroom activities ( $r = -.24$ ,  $p < .05$ ) and teamwork ( $r = .25$ ,  $p < .05$ ).

Finally, in order to investigate the associations between the variables in a more detailed manner, a latent growth model was constructed. After deleting non-significant variables, a model was developed to determine whether ECPs' educational level and quality of teamwork had an effect on their initial cortisol level and its change during the day by using three cortisol measurement points (morning, afternoon and evening). The decision to use 3 of the 5 cortisol measurement points was taken because the chosen points provide a linear pattern of decreasing values across the day. When using logarithmically transformed cortisol values, the mean intercept value (mean morning cortisol value) was 3.02 and the mean slope value was -2.26, indicating the average decline in cortisol values. The estimated model, which is depicted in Figure 3, fit the data well  $\chi^2(4) = 5.510$ ,  $p = .239$ , CFI = .96, RMSEA = .049. The results showed first that the higher the morning cortisol values, the more pronounced the change (i.e. decrease) ( $\beta = -.55$ ) during the day, and second, that both the educational competence level of the day-care personnel ( $\beta = -.33$ ) and teamwork ( $\beta = -.32$ ) predicted lower morning values and were related to each other  $r = .43$ .



**Figure 3.** Initial level cortisol and its change using educational qualification and teamwork of ECPs as predictors

To conclude, the model shows better-qualified ECPs and professionals demonstrating better quality teamwork had lower cortisol values in the morning. Teamwork did not correlate with overall changes in cortisol during the working day; instead, the quality of teamwork related to the morning values only.

## 5.2. Free salivary cortisol and alpha-amylase in determining ECPs' stress regulation

In Studies II and III one general aim was to investigate the usefulness of different biomarker variables in determining the balance or dysfunction of ECPs' stress regulation. More detailed descriptive statistics of these variables are presented in the original studies (see Studies II and III). The following section presents the central findings.

On average, salivary cortisol levels of ECPs in integrated special groups followed a typical pattern on both working days and weekend days (Wilcox, Granger, Szanton & Clark, 2014), i.e. the levels were higher in the morning, peaking half an hour after waking, and then decreased slightly towards evening with the lowest values measured just before going to bed.

The diurnal patterns were symmetrical on both days, but there were statistically significant differences at the second ( $t(75)=5,63$ ,  $p<.00$ ), third ( $t(77)=6,34$ ,  $p<.00$ ) and fourth ( $t(77)=-3,5$ ,  $p<=.001$ ) measurement points between the working day and the weekend day; on the working day, the average morning peak was sharper, and the values were higher during the day than on the weekend day. Although the working day values declined to lower levels towards the end of the day compared to the weekend day, this difference was not statistically significant.

sAA levels were also quite stable on both days. There was a slight decline during the first 30 minutes of waking hours on both days. After that, the values increased steadily until the afternoon, after which the values declined towards the evening. The patterns were quite similar on both days, and the values differed significantly only at the second ( $t(75)=-3.061$ ,  $p=.003$ ) and fifth ( $t(75)=-2.163$ ,  $p=.034$ ) measurement points. This wave form in the profile is typical of the diurnal secretion of sAA (Wilcox et al., 2014).

Further, the differences between ratio values of cortisol and alpha-amylase during weekend and working day were analysed, but there were no differences in ratio values. This indicates that, on average, ECPs' stress regulation systems were quite stable, and there were no major disturbances in regulation during the working day. Even though the individual values may be higher during the working day, the ratio of salivary cortisol over AA showed no difference between the working and the weekend days.

### **5.3. ECPs' work engagement, stress regulation and their associations with the quality of pedagogical work in integrated special kindergarten groups**

According to the theoretical model, the job demands and resources investigated in Study I, especially the balance between them, cause different kinds of energy paths that may lead to either positive or negative outcomes (Hakanen, 2009a). These outcomes may be seen in work engagement or burnout and furthermore in better health or, conversely, in illness. Additionally, the assumption was that more engaged workers perform better in their work, which is actualised in this study as higher quality pedagogical work. In this thesis the developmental nature of work engagement or burnout was not detected due to the cross-sectional study design, which is why the focus in Studies II and III was only on determining the extent to which ECPs experience work engagement and burnout and how these are associated with their pedagogical work. The results of the work engagement and burnout surveys are presented in Table 3.

Table 3. ECPs' experienced burnout and work engagement according to profession, age and period of employment

<b>Burnout</b>	<b>N</b>	<b>Mean</b>	<b>Sd</b>	<b>Min</b>	<b>Max</b>	<b>None</b>	<b>Moderate</b>	<b>Serious</b>
<i>profession</i>						<i>n</i>	<i>n</i>	<i>n</i>
assistant	15	1.51	1.09	0.05	3.46	8	7	0
nurse	19	1.24	0.75	0	2.8	11	8	0
special teacher	37	1.12	0.96	0.08	5.07	26	10	1
<b>total</b>	<b>71</b>	<b>1.25</b>	<b>0.94</b>	<b>0</b>	<b>5.07</b>	<b>45</b>	<b>25</b>	<b>1</b>
<i>age</i>								
<30	7	1.27	0.37	0.83	1.68	4	3	0
30-50	39	1.3	1.05	0	5.07	22	16	1
>50	24	1.11	0.9	0.05	3.37	19	5	0
<b>total</b>	<b>70</b>	<b>1.23</b>	<b>0.94</b>	<b>0</b>	<b>5.07</b>	<b>45</b>	<b>24</b>	<b>1</b>
<i>period of employment</i>								
<5	12	1.72	1.33	0.05	5.07	6	5	1
5-10	7	1.09	0.79	0	2.08	4	3	0
>10	51	1.16	0.83	0.08	3.37	34	17	0
<b>total</b>	<b>70</b>	<b>1.25</b>	<b>0.94</b>	<b>0</b>	<b>5.07</b>	<b>44</b>	<b>25</b>	<b>1</b>

<b>Work engagement</b>	<b>N</b>	<b>Mean</b>	<b>Sd</b>	<b>Min</b>	<b>Max</b>	<b>High</b>	<b>Moderate</b>	<b>Modest</b>	<b>Low</b>
<i>profession</i>						<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
assistant	15	4.47	0.87	2.88	5.6	4	2	5	4
nurse	19	4.89	0.81	3.06	5.82	10	4	2	3
special teacher	37	5.02	0.59	3.24	5.88	16	14	4	2
<b>total</b>	<b>71</b>	<b>4.87</b>	<b>0.74</b>	<b>2.88</b>	<b>5.88</b>	<b>30</b>	<b>20</b>	<b>11</b>	<b>9</b>
<i>age</i>									
<30	7	4.4	1.02	2.88	5.38	2	2	1	2
30-50	39	4.97	0.62	3.24	5.88	18	11	6	3
>50	24	4.82	0.76	3.06	5.82	9	7	4	4
<b>total</b>	<b>70</b>	<b>4.86</b>	<b>0.74</b>	<b>2.88</b>	<b>5.88</b>	<b>29</b>	<b>20</b>	<b>11</b>	<b>9</b>
<i>period of employment</i>									
<5	12	4.55	1.05	2.88	5.6	5	2	1	4
5-10	7	4.81	0.43	4.12	5.35	2	2	2	0
>10	51	4.95	0.68	3.06	5.88	22	16	8	5
<b>total</b>	<b>70</b>	<b>4.87</b>	<b>0.74</b>	<b>2.88</b>	<b>5.88</b>	<b>29</b>	<b>20</b>	<b>11</b>	<b>9</b>

The results showed that serious burnout symptoms ( $M=4.9$ ,  $SD=0.74$ ) were rare (1.4%) among ECPs, but 35 per cent of the ECPs showed moderate exhaustion. Different professions (special teachers, nursery nurses, assistants) did not differ according to perceived burnout ( $\chi^2(3) = 2.62$ ,  $p > .05$ ). Nor were there differences between ECPs according to different educational backgrounds ( $\chi^2(3) = 2.5$ ,  $p < .05$ ) or educational qualifications ( $U=326.5$ ,  $p > .05$ ). Likewise, no correlations between burnout and ECP characteristics were observed. However, the sub-dimension – decreased professional self-esteem – was negatively correlated with the ECPs' age ( $r = -.28$ ,  $p < .05$ ) and period of employment ( $r = -.40$ ,  $p < .01$ ). This indicated that the younger the ECP or the shorter the working period in early special education, the more the ECP experienced reduced professional self-esteem.

Most of the ECPs were highly engaged in their work. A total of 43.5 per cent of the participants reported high levels of work engagement; only 13.5 per cent reported low levels, and 25.9 per cent reported modest levels. The ECPs were dedicated, engaged and motivated to work with children. Work engagement correlated negatively with burnout ( $r = -.34$ ,  $p < .01$ ): those who were highly engaged were unlikely to burn out. Work engagement ( $r = .26$ ,  $p < .05$ ), and especially vigour ( $r = .31$ ,  $p < .05$ ) were positively correlated with qualifications; ECPs with higher level qualifications were more likely to report high levels of work engagement and vigour. The Mann-Whitney test confirmed that the difference was statistically significant between assistants (the least qualified) and special teachers (the highest level of qualification), both in terms of vigour ( $U=1.43$ ,  $p < .05$ ) and work engagement ( $U=1.46$ ,  $p < .05$ ). The educators' age correlated with dedication ( $r = .24$ ,  $p < .05$ ): the older the educator, the higher the level of dedication.

The aim was to detect the connections between multiple biomarker variables, work engagement, burnout and pedagogical work. ECPs' job performance in terms of quality of their pedagogical work was assessed to be high in integrated special groups, even though minor variation was detected between the groups. These results were reported in our previous study (Alijoki, Suhonen, Nislin, Kontu & Sajaniemi, 2013) as specified in the original Study III. As a conclusion, the results demonstrated that the classroom activities were well planned and met children's individual needs. Schedules and transitions were well prepared and informative. However, all groups reported slightly lower quality scores on the use of visual elements in the organization of the activities and in the documentation and written follow-ups to the children's development. The quality of the teamwork was notably high across the groups. The teams were engaged and shared the same philosophy; working with the children was goal-orientated and justified. All in all, the interaction between the children and the ECPs was positive and respectful.

In the present study the focus was not on the pedagogical quality in general, but rather on how well-being and stress regulation were associated with pedagogical work. Contrary to the hypothesis, there were no associations between stress regulation variables and job satisfaction variables. As the results demonstrate with salivary cortisol/alpha-amylase ratios and with multiple different biomarker variables, no connections between work engagement and burnout and stress regulation were evident. However, the most prominent finding was the close relationship between multiple stress regulation variables and the quality of pedagogical work in ECP teams. The results of the correlational analyses are presented in Table 4.

An especially interesting finding was the usefulness of various AA variables in identifying connections between stress regulation and the quality of work. Additionally, connections between pedagogical work, especially teamwork, and various AA variables and the cortisol over the alpha-amylase ratio showed that the quality of the teamwork was positively associated with AUC values in sAA and negatively associated with cortisol/sAA ratio.

Of all the sub-areas comprising pedagogical work (i.e. classroom arrangements, schedules and transitions, classroom activities, teamwork and behaviour plans), the sub-area of 'teamwork' demonstrated the greatest number of relationships with the biomarker variables.

**Table 4. Correlations between salivary cortisol and  $\alpha$ -amylase variables and pedagogical work and between work engagement and pedagogical work**

	N	Classroom arrangements	Schedules transition	Classroom activities	Team work	Behaviour plans
DeltaC1	68	-0.04	0.02	0.05	0.05	-0.01
DeltaC2	71	-0.20	-0.19	-0.15	0.01	-0.02
DeltaA1	68	0.39**	0.22	0.14	0.18	0.10
DeltaA2	71	0.18	0.13	0.05	0.26*	0.04
CAR1	68	-0.10	0.00	-0.03	0.05	0.06
CAR2	71	-0.08	0.14	-0.05	-0.07	0.05
sAAar1	68	0.01	0.05	0.15	0.27*	0.20
sAAar2	71	0.03	0.09	0.20	0.27*	0.23
AUCDayC1	68	-0.23	-0.12	-0.31**	-0.14	-0.22
AUCdayCor2	71	-0.05	-0.01	-0.13	-0.11	-0.02
AUCDayA1	68	0.03	0.03	0.09	0.24*	0.08
AUCDayA2	71	0.06	0.12	0.15	0.31**	0.17
COA1	67	0.06	0.02	0.16	-0.31*	0.14
COA2	70	0.05	0.00	0.09	-0.33**	0.13
AOC1	67	-0.08	-0.08	-0.17	-0.20	-0.14
AOC2	70	-0.13	-0.09	-0.22	-0.20	-0.16
Vigour	71	0.11	0.21	0.14	0.07	0.25*
Dedication	71	0.04	0.24*	0.17	0.001	0.29*
Absorption	71	0.06	0.11	0.08	-0.03	0.17
Work engagement	71	0,08	0,21	0,14	0,01	0,26*



## 6 Discussion

This multidisciplinary study contributes to a growing body of literature that provides evidence for associations between early childhood professionals' work-related well-being, stress regulation and the quality of ECPs' pedagogical work. The study offers novel findings and an integrative perspective as well as multiple methodologies for investigating work and work-related well-being among ECPs. Using the perspective of positive psychology, the aim was to gain important knowledge regarding the resourceful aspects of ECE work that serve to engage ECPs in their daily work with children and contribute to flourishing ECP teams. By using multiple methodologies the study aim was to obtain multidimensional pictures of elements associated with ECPs' abilities to deliver the best possible early childhood education service.

Overall, the main findings are encouraging and demonstrate that the ECP participants were dedicated and motivated by their work with children and experienced their resources at work as adequate. It was by using the perspective of positive psychology that these aspects emerged. The alternative, namely a focus on malaise and the negative aspects of the work of ECE, shows only half the picture. The findings suggest that ECE is much more than just demanding and stressful; indeed, working in this field seems to offer ECPs gratification and happiness. It is likely that ECPs who enjoy their work are more able to handle work-related challenges and other negative aspects in a constructive way. Most of the ECPs studied here felt they had some degree of autonomy in their working day. Previous studies have shown that autonomy is a significant resource (Demerouti et al., 2001; Schaufeli & Taris, 2014), as opportunities to make decisions about a job may further increase ECPs' motivation and work engagement. In this study autonomy was correlated with the ECPs' professions; the results showed that teachers and special teachers considered themselves to be less autonomous in their work than nursery nurses and assistants. The lack of autonomy reported by teachers and special teachers is a concern, given that role ambiguity and confusion over sharing team responsibilities may challenge well-being (Klassen & Chiu, 2010). In the field of early childhood education there is particular concern that a shared working culture is somewhat lacking, and the competencies and knowledge of different occupational groups in the sector are not used effectively (Nummenmaa & Karila, 2006; Onnismäa & Kalliala, 2010). Clearly defining the roles of each of the different groups involved in early childhood settings may help employees feel more in control (more autonomous) and ultimately affect their well-being.

The main findings revealed a generally positive experience of social support, especially from supervisors. The results suggest that better support from colleagues is associated with less emotional pressure at work and with higher-quality pedagogical work in kindergarten groups. In addition, higher levels of autonomy seem to be linked with both lower emotional pressure and positively linked with better teamwork and classroom activities. There is an inverse relationship between autonomy and social support, and whilst autonomy has a positive impact on well-being, too much autonomy can be experienced as a lack of social support, with a consequent negative impact on well-being (Hakanen et al., 2006). The results of the present thesis offer only suggestions regarding the causality of these phenomena, but the current literature has demonstrated that social support is particularly important in reducing the load imposed by the demanding aspects of a job (Bakker et al., 2004; Schaufeli et al., 2009); being left alone to work out problems can affect well-being negatively. It is important that ECPs feel appreciated and respected by both colleagues and supervisors, particularly when they encounter challenges. The autonomy to make decisions about when to seek support and to know that support will be available when needed are clearly key components of employee well-being. Furthermore, according to the JD-R model, a balance between demands and resources is needed for a positive energy path leading to work engagement (Schaufeli & Taris, 2014). The engagement of ECPs is also beneficial to the whole educational community, as work engagement tends to be contagious (Perhoniemi & Hakanen, 2013; Bakker & Xanthopoulou, 2009). Engaged employees strengthen teamwork and improve the well-being of the whole team (Hakanen, 2009a; Hakanen et al., 2006). In addition, work engagement not only benefits ECPs, but also contributes significantly to the quality of the learning opportunities offered children and thus has a further impact on the development and well-being of children.

Working in the field of education and welfare is often reported as stressful and challenging (e.g. Klassen, 2012; Hakanen et al., 2006; Hakanen, 2009a). This study offers partly supplementary results, as the participants' experiences of resources at work were positive. However, despite the fact that most of the ECPs in this study considered their work resources to be good, others were not so positive. This finding should be taken seriously, as job resources are an important factor in well-being, especially when the demands are high. ECE work is highly interpersonal and emotionally loaded and coping problems should not be allowed to become chronic. Serious burnout symptoms rarely occurred among the participants, but 35 per cent of ECPs reported moderate burnout. The signs of burnout detected indicate that, although ECPs work is inspiring, there are also demanding factors that may, if they become chronic, endanger occupational well-being. Similarly, if burnout symptoms become chronic, and no support is available to mediate stress, serious health problems and poorer

work quality may result. A combination of lack of resources and high job demands may lead to high levels of emotional pressure and finally to exhaustion and burnout (Bakker et al., 2007; Zhai et al., 2011). Better resources may reduce the influence of demands (Bakker et al., 2004); for example, in Study I, better supervisor support was shown to be associated with less emotional pressure.

An interesting finding in this thesis was that certain job demands and resources were related to the pedagogical work. Even though the findings are only descriptive in nature and thus no causality could be confirmed, still the associations between resources, demands and pedagogical work were evident. The results suggest that it is possible that, in ECP teams where the quality of teamwork is poor, classroom activities are not well planned, and where behaviour plans are poorly developed, ECPs experience greater emotional pressure. Emotionally strained ECPs cannot perform at their best, a situation associated with lower pedagogical quality. In contrast, it might be that supervisor support, which was associated with teamwork, may, if adequately offered, enable ECPs to work together better, something seen in high-quality pedagogical work. The findings demonstrate that better experienced resources such as social support and autonomy were linked to better quality in multiple dimensions of pedagogical work. This supports the hypothesis that ECPs' experienced work-related well-being may be reflected in their work quality.

Furthermore, there were connections between the ECPs' characteristics (e.g. age and competence) and work engagement and burnout. Interestingly, the ECPs' age was related to reduced professional self-efficacy; younger educators and those who had worked in the field of early special education for shorter periods were more likely to have lower professional self-esteem. The results also showed that higher levels of work engagement were specific to older ECPs. It may be that younger, recently graduated ECPs experience a disparity between the demands of working life and the preparation for that work they received in their training and academic education. These challenges may cause feelings of inadequacy and disappointment. Younger ECPs are also more likely to think about changing their profession during their first years in the field (Onnismaa, Tahkokallio, Lipponen & Reunamo, 2013), perhaps because they struggle to establish a secure professional identity and occupational self-esteem. This is an important challenge for teacher education at universities; there is a need to consider how to improve education to respond better to the demands of the practical work in the field of early childhood education. More dialogue between practitioners and academics is needed, and this dialogue should be based on the idea of sharing skills and knowledge. In an atmosphere that is open and encouraging, young ECPs with fresh thoughts and ideas could come together with experienced ECPs to create a new, even better culture of pedagogical work.

The purpose of utilizing a multidisciplinary approach to investigate the ECPs work-related well-being was to combine ECPs' self-reported information with

physiological stress data. One aim was to determine if the experienced job satisfaction (e.g. job resources and work engagement) or burnout and demands are associated with stress regulation at the physiological level. Contrary to the prior hypothesis, no significant relationship between work engagement and burnout vis-à-vis stress regulation was found. Nor was there a relationship between the ECPs' experienced job demands and resources and their stress regulation. This may have been because the study participants were healthy and motivated and were not suffering from any serious depression or burnout. Although literature on the associations between work engagement and physiological stress measurements is scarce, the findings of the present study are nevertheless in line with one of the few, namely Langelaan et al. (2006), who also found no statistically significant correlations. The studies that have demonstrated associations between physiological and psychological measures of work-related well-being (Chandola et al., 2010; Danhof-Pont et al., 2011) have, in the majority of cases, focused on the negative aspects of work, such as the relationship between extreme burnout and stress; hence, their findings are not comparable to the current study. It appears that the relationship between physiological stress and work engagement is only evident in extreme cases, where work engagement is approaching toxicity.

A novel aim in this study was to investigate the potential usefulness of multiple salivary cortisol and alpha-amylase variables for determining stress. This innovative approach combining the ratio values of salivary cortisol and alpha-amylase was utilized to detect variation in the balance of stress regulation across working days and on weekend days. However, contrary to the hypothesis, namely that ECPs' stress regulation system is alert on working days and more balanced on the weekend, the results of Study II demonstrated that there were no differences in the ratio of cortisol/sAA or sAA/cortisol on a weekend day as opposed to a working day. This indicates that, even though statistically significant variation in single variables and measurement points in salivary cortisol and alpha-amylase variables between working day and weekend day were found, no variation in ratio values was found. On average, this means that the stress regulation systems of the ECP participants seemed to be balanced.

The most interesting finding in Study I was the demonstration of correlations between cortisol activity and pedagogical work in the regular kindergarten groups: in particular, it was found that the lower the quality of teamwork, the higher the morning cortisol values of the ECPs. Better quality co-operation and a shared working culture, as well higher educational qualifications were associated with ECPs' lower morning cortisol values. Although, on average, cortisol levels followed an atypical diurnal pattern, meaning that cortisol concentrations were higher early in the morning, declined rapidly across the morning and decreased slightly through the afternoon to the evening (as identified by Wilcox et al., 2014; Dmitrieva et al., 2013), there were participants whose cortisol levels were

atypical, that is, either heightened or flattened. For example, a higher morning cortisol waking response (Fekedulegn et al., 2012) or flatter cortisol levels (Liao, Brunner & Kumari, 2013) have been linked to higher levels of experienced work-related stress. Previous studies have suggested that high morning values are connected with work overload (Nater, Rohleder, Schlotz, Ehlert & Kirschbaum, 2007; Groenewald et al., 2012), while others have shown that high evening values are indicators of vulnerability to work-related stress (Morgan et al., 2002).

The findings of the present study suggest that there are ECPs who are potentially vulnerable to workplace stress and its consequences, based on these atypical cortisol patterns. However, the results are descriptive by nature, and therefore require careful interpretation. Additionally, as a methodological conclusion drawn from Studies II and III, the results complement those reported by Ali and Pruessner (2012), El-sheikh et al. (2008) and Hidalgo et al. (2014) in terms of the usefulness of the different sAA variables and the cortisol and sAA ratios. The main findings suggest that the activity of the sAA and cortisol/sAA ratio (COA) might be especially related to the social factors associated with work-related well-being (e.g. relationships between co-workers, teamwork). However, further studies are needed to explain this relation in greater depth. Nevertheless, the findings certainly suggest that using cortisol measurements as the sole gauge of physiological stress regulation may not produce a full understanding of what is in fact a complex physiological balancing act.

These results complement the existing literature (Hakanen 2009a; Hakanen, et al., 2006; Xanthopoulou et al., 2009), which shows close connections between work-related well-being and job performance. There were connections between some sub-categories of pedagogical work and work engagement, indicating that better quality ECE really is associated with more highly motivated and engaged workers. However, contrary to the prior assumption, namely that a higher level of engagement within ECP teams would be related to better teamwork, no connections were found between the quality of the teamwork and any dimensions of work engagement. This was rather surprising, as the close relations between the engagement of the individual worker and the organizational climate have been established (Perhoniemi & Hakanen, 2013).

## 6.1. Limitations

This study has some limitations that should be taken into consideration in interpreting the results. Overall, the study is descriptive in nature, and hence does not allow inferences about causality between the variables. Future studies with more exact data collections and longitudinal study designs are needed to

reveal the developmental nature of work-related well-being and the variation in stress regulation across time.

In Study I the participants represented a somewhat selective sample because the day-care centres involved were already participating in our ongoing intervention study. This suggests that the participants were motivated and inspired to improve the quality of their work, and thus may not be representative of other day-care staff in general. In addition, the participants in Studies II and III also represented somewhat selective samples because the composition of integrated special groups is not uniform across the country. There are likely to be differences between municipalities in the organization of early childhood special education in kindergartens. However, the results obtained from this study population nevertheless suggest that integrated special groups might be an extremely beneficial way to organize ECSE in kindergartens. The adult-child ratio in the study population is optimal for responding to children's individual special educational needs, and potentially supports fruitful interactions between the adult and child participants. In addition, one reason for high quality pedagogical work and high levels of work engagement might be the highly educated and qualified staff in integrated special kindergarten groups. In Helsinki, for example, this means that there are two special teachers in each group.

Secondly, in Study I the ability to collect saliva was limited to a single day. Certainly, the ability to make comparisons between cortisol levels on working and non-working days is more useful, which is why in Studies II and III this matter was taken into account, and the data collection period ran across two days. Studies have shown that there is significant intrapersonal variation in cortisol levels on separate days (Kudielka, Gierens, Hellhammer, Wüst & Schlotz, 2012), and collecting samples on only one day meant that it was not possible to account for this. However, despite this limitation, it may be suggested that data collected over one day remain valid and useful, and give an idea of the diurnal variation in stress reactivity. In particular, dividing the diurnal patterns into low, moderate and high groups revealed groups of participants whose diurnal patterns were either heightened or flattened. Additionally, it was not possible to investigate the intra-individual variation in different biomarkers on the different working days; however, to improve the validity of the measurements, we were able to compare the variables across the working and the weekend days. More sophisticated methodologies and data collection design are needed to acquire data that will allow us to draw further conclusions.

A cross-sectional study design was used, which does not allow conclusions to be drawn regarding the stability of stress regulation; hence, it gives only a picture of the current situation. A follow-up study design could be effective in determining the developmental nature of stress regulation as well as work engagement and burnout. A previous study (Bakker & Bal, 2010) has shown that

there is possible intra-individual variability in the level of work engagement experienced. Kudielka et al. (2012) maintain that there is some daily or weekly intra-individual variation in cortisol. In the current study design it is not possible to draw any conclusions about the development or stability of these variables over time. In future it would be wise to collect the data across different time points during a year (for example, in the autumn and in the spring) to investigate differences over a longer period of time. Furthermore, the job demands and resources model was only partly applied; hence, the studies concerning demands and resources and work engagement and burnout were separate, and the population used for each study was different, so it was not possible to examine the extent to which the ratio of demands and resources would lead to either positive or negative outcomes.

Likewise, we did not investigate the details of the job demands and resources that may have had an impact on the experience of work engagement or burnout, nor did we inquire about the participants' personal lives (e.g. divorce or serious illness of a close relative), in which situations may have had an impact on coping at work. Well-being at work is influenced by a multiplicity of factors related to employees' private lives. Therefore, the direct effect on well-being caused by work is not that obvious; instead, it is composed of the interplay between employees' personal lives and their work.

Furthermore, in future it is necessary to be even more exact in the sampling times of salivary cortisol and alpha-amylase measures. Conducting the research in natural environments instead of laboratory conditions is challenging; hence, the possibility of guaranteeing the accuracy of measurements is limited. In this study the main idea was to detect the changes in stress regulation during the working and weekend days in normal, everyday situations. This is why the sampling procedure was adapted to each participant's daily rhythm, not standardized to be equal for everyone. This means, for example, that the waking time was not preset. However, in the sampling diary which participants filled out, the sample times showed that they followed the guidelines and collected samples at the right time intervals.

One limitation of the assessments of pedagogical work was a lack of interrater reliability between the evaluations. There were multiple raters, but the coherence of their assessments was not checked. To guarantee the reliability of the observations, proper training was provided for the consultative special teacher who conducted the measurements. The researcher on our team guided the raters in proper use of the scale and instructed them in how to use it in as similar a way as possible. Nevertheless, this is a critical matter that should be carefully observed. In future studies, interrater reliability should be offered by utilizing parallel assessments in the same classrooms.

This thesis is made up of three studies that were part of two separate research projects; hence, the data collection and study design were to some extent beyond

the control of the researcher. Additionally, the sub-studies were conducted with different study populations and with partly different measures (e.g. number of biomarkers, the 3-point vs the 5-point scale used in LEANS). For this reason no comparisons between the ECPs in regular and special groups were made. This, however, was not the purpose of this current study, yet is definitely an interesting design for further studies.

## 6.2. Conclusions and future directions

Regardless of the limitations, this study offers important insights into ECPs' work in early childhood education. The main findings highlight the connections between teamwork and stress regulation, and emphasize the importance of a positive climate at work. Members of ECP teams, where the working culture is shared and where teamwork and pedagogical work are of high quality, are more likely to have well-balanced stress regulation. In the present study design it is not possible to draw any conclusions regarding the causality of the variables; further studies are needed to determine those answers. However, as a sophisticated guess, more balanced stress regulation and better teamwork might be due to the social nature of stress regulation. Stress regulation is not a separate internal process; instead, it is influenced by environmental social feedback. The ability to regulate stress depends on early experiences in interactional relationships and is shaped over the course of one's life. This strongly supports the fact that in a positive climate, stress hormone fluctuation is more balanced. Just as children need co-regulation<sup>6</sup> in stressful events, co-regulation is also important for adults in encountering demands and challenges at work. Co-regulation is a relevant concept for adult populations, as it describes the social aspects and the extent to which the biology of human beings is socially dependent. Co-regulation means being attuned to another person's emotions and attempts to enhance adaptive behaviour (Fogel, 1992; Sajaniemi et al., 2015). In working life, understanding this idea creates a more open and shared working culture among co-workers.

This is the reason that subsequent studies are required to investigate the developmental pathways of well-being at work and determine how the teamwork revealed here could be an enhancing resource to boost the well-being of the entire working team. The main findings relating to teamwork are interesting, given that previous studies (Sajaniemi et al., 2011; 2014) have shown an inverse relationship between the adults' teamwork quality and the balance of children's stress regulation. Hence, the present results provide suggestions for the extent to

---

<sup>6</sup> The concept of co-regulation (*kanssasääteily* in Finnish) is presented in Fogel, 1992 and in Sajaniemi, Suhonen, Nislin & Mäkelä, 2015.



which ECPs' well-being contributes to the overall quality of ECE and ECSE provision. The results also indicate that a systemic perspective in investigating well-being in ECE settings is required, because all participants, both adults and children, are exposed to the same social and emotional climate. Hence, developing teamwork on an ECP team is not only beneficial for adults, but also for children.

More studies focusing on group dynamics are needed to enhance understanding of how high quality pedagogical work is constructed in the interactional processes between ECPs and children. At the core of pedagogical work is the ECPs' ability to be pedagogically sensitive to children. In group settings this could be described by employing the concept of systemic sensitivity; in other words, focusing not only on educator-child dyads, but also on the multi-directional interaction processes between different actors in the group. This means that investigating the interaction in ECE settings is not enough if interactions between ECPs are not taken into account. The quality of interaction between the adult workers is not trivial; rather it is the mirror through which the children learn social rules and how to treat others. In this sense the kind of role model that ECPs provide is highly important. Supportive, positive interaction and showing appreciation of others will definitely be mirrored back to the children and other ECPs and enhance the atmosphere among co-workers, and, as importantly, among the children. The work in ECE and ECSE is strongly systemic and offers fascinating scenery for investigating multidimensional interactional processes. It also challenges ECPs to be more open to children's initiatives and feedback, as well as open to children's influences. This further challenges ECPs to be more open to colleagues' emotions and ideas which could enrich the working culture of the entire team. Systemic sensitivity reflects openness, flexibility and adaptation to change and is responsive to diversity.

In future, it would be necessary to use the same study design to investigate both children's and adult workers' stress regulation and well-being in early childhood education settings. At the moment, the ongoing research project DAGIS (see <http://dagis.fi/>; Määttä et al., 2015) is a large-scale intervention study whose purpose is to enhance healthy behaviours, well-being and stress regulation in kindergartens for both adult and child participants. This integrative study design will allow the researchers to detect in more detail the cross-over of well-being among child and adult participants.

In examining ECPs' work-related stress and the factors that affect it, future studies should endeavour to provide deeper insight into the interaction of the individual and the environment, given our findings on the relationship between pedagogical quality, resources and demands, and workplace stress. Likewise, positive characteristics should be emphasized and investigated to determine the extent to which work-related well-being develops. Well-being at work is not simply the absence of illness, and it may spread among people who work

together and thereby lead the whole community to flourish (Hakanen, 2009a). Because children are potentially involved in this process, studying both adult and child members in kindergarten groups would be highly beneficial.

In Finland early childhood education has traditionally been seen as a service that involves education and care and is part of the state's support services offered families with children (THL, 2015). Above all, early childhood education is a service that is child-centred and in the best interests of the child. The Finnish education system has guaranteed every child a subjective right to early childhood education through ECE services. This has guaranteed social equality and justice for every child regardless of socio-economic background or family situation. Due to the current political and economic situation in Finland, however, early childhood education has become a target for spending cutbacks, measures that would potentially affect not only the children and their families, but also the working conditions of ECPs. Proposals include limiting the state's obligation to provide ECE to only 20 hours per child per week and raising the adult-child ratio from 4:1 to 5:1. Neoliberal ideas of accountability have become part of ECE services in Finland, and putting efforts into making the delivery of the service more efficient is one indicator of this marketing ethos. According to the scenarios that have been presented in the literature (Bradbury, 2012; Osgood, 2006), this ethos could lead to changes in the work of ECPs. It could mean following top-down regulations outlining standards to be achieved and focusing on priming children for school readiness instead of providing children an environment that supports nurturing social relationships with peers and adults and offering playful, quality learning experiences. Such measures would further lead to diminished autonomy for ECPs (Sims, Forrest, Semann & Slattery, 2014). At the time the data were collected for the present study, the situation was different and rather positive, as described above. The question is, how will the situation change after the proposed reforms. Inevitably, there would be a major impact on high quality ECE service delivered by motivated and engaged ECPs. The proposed reforms require ECE professionals to adapt to the change. This raises the question of how the ECPs will manage. How will they survive in the midst of these demands

The ongoing reform in Finland indicates a lack of respect for the work of early childhood professionals. Whilst academics and researchers have long argued that ECE is a professional and important field, this attitude has not been reflected in the views of the general community, administrators or policy-makers. Recently, media discussion sparked by the debate on expenditure reductions has increased, and those working in the field of ECE have begun to be heard. More self-esteem and pride among ECPs, however, is needed to protect the working conditions that make it possible for ECPs to experience high levels of work engagement, as demonstrated in the main findings of this thesis. The proposed changes should not be seen only as top-down imposed regulations;

rather, despite the challenges, ECPs have many ways to develop their professionalism and pedagogical work, as well as to find meaningfulness in ECE work. Firstly, it is important to recognize that a balance is needed between autonomy and social support (both supervisor support and teamwork support), particularly in the challenging work environments typical of ECE. Practitioners can improve the quality of the ECE they deliver when they work together and support each other, while maintaining a clear understanding of their roles and feelings of autonomy to enact those roles. The balance of autonomy with social support not only facilitates better pedagogical quality, it also improves individual well-being. Opportunities to develop cohesive teams need to be a recognized and valued component of early childhood education. At the policy level, clear identification of the various roles within ECE is undoubtedly important, along with clear expectations of work performance and the ability to operate independently within those roles. Whilst much research is still needed to explicate the complex inter-relationships between work demands and resources, work stress and pedagogical quality, I argue that this thesis provides a useful foundation for understanding these complexities in the context of Finnish early childhood education.



## References

- Adam, E.K., & Gunnar, M.R. (2001). Relationship functioning and home and work demands predict individual differences in diurnal cortisol patterns in women. *Psychoneuroendocrinology*, 26, 189–208.
- Ahnert, L. (2005). Parenting and alloparenting: The impact on attachment in humans. In C. S. Carter, K. E. Ahnert, S. B. Hrdy, M. E. Lamb, S. W. Porges & N. Sachser (Eds.), *Attachment and bonding: A new synthesis*, (pp. 229-244). Cambridge, Mass: Massachusetts Institute of Technology.
- Ali, N., & Pruessner, J. C. (2012). The salivary alpha amylase over cortisol ratio as a marker to assess dysregulations of the stress systems. *Physiology & Behavior*, 106, 65–72.
- Alijoki, A., Suhonen, E.A., Nislin, M., Kontu, E., Sajaniemi, N. (2013). Pedagogical activities in the special groups and the quality of learning environment. *Journal of Early Childhood Education Research*, 2(1), 24-47.
- Alimo-Metcalfe, B., Alban-Metcalfe, J., Bradley, M., Mariathasan, J., & Samele, C. (2008). The impact of engaging leadership on performance, attitudes to work and wellbeing at work: A longitudinal study. *Journal of health organization and management*, 22(6), 586-598.
- Andrew, Y., & Newman, B. 2012. The value of childcare: Class, gender and caring labour. *Contemporary Issues in Early Childhood*, 13(3): 242–247.
- Baptiste, R. N. (2008). Tightening the link between employee wellbeing at work and performance: A new dimension for HRM. *Management Decision*, 46(2), 284-309
- Bakker, A. B., Demerouti, E., & Schaufeli, W. (2003). The socially induced burnout model. In S. P. Shohov (Ed.), *Advances in psychology research*, (Vol. 25, s. 13-30). New York: Nova Science Publishers.
- Bakker, A. B., Demerouti, E., & Verbeke, W. (2004). Using the job demands-resources model to predict burnout and performance. *Human Resource Management*, 43(1), 83-104.
- Bakker, A. B., & Demerouti, E. (2006). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, 22(3), 309-328.
- Bakker, A. B. & Bal, P. M. (2010). Weekly work engagement and performance: A study among starting teachers. *Journal of Occupational and Organizational Psychology*, 1, 189–206
- Bakker, A.B., & Demerouti, E. (2012). Job demands-resources theory. In Chen, P. & Cooper, C. (Eds.), *Well-being: A complete reference guide*. Chichester: Wiley-Blackwell.

- Bakker, A. B., Demerouti, E., Hakanen, J. J., & Xanthopoulou, D. (2007). Job resources boost work engagement, particularly when job demands are high. *Journal of Educational Psychology*, 99(2), 274-284.
- Bakker, A. B., & Xanthopoulou, D. (2009). The crossover of daily work engagement: Test of an actor-partner interdependence model. *Journal of Applied Psychology*, 94, 1562-1571.
- Bakker, A. B., & Leiter M. P. (2010). Work engagement. *The handbook of essential theory and practice*, (pp. 5-20). New York: Psychology Press.
- Bradbury, A. (2012). 'I feel absolutely incompetent': professionalism, policy and early childhood teachers. *Contemporary Issues in Early Childhood*, 13(3): 175-186.
- Bauer, A. M. Y. M., & Boyce, W. T. (2002). Associations between physiological reactivity and children's behavior: Advantages of a multisystem approach. *System*, 23, 102-113.
- Bigras, N., Bouchard, C., Cantin, G., Brunson, L., Coutu, S., Lemay, L., . . . Charron, A. (2010). A Comparative Study of Structural and Process Quality in Center-Based and Family-Based Child Care Services. *Child and Youth Care Forum*, 39, 129 - 150.
- Bollini, A. M., Walker, E. F. Hamann, S., & Kestler, L. (2004). The influence of perceived control and locus of control on the cortisol and subjective responses to stress. *Biological Psychology*, 67, 245-260.
- Bronfenbrenner, U. 1979. *The ecology of human development: Experiments*. Cambridge, Mass: Harvard U. P
- Bronfenbrenner, U. (Ed.). 2005. *Making human beings Human. Bioecological perspectives on human development*. Thousand Oaks, CA: Sage Publications.
- Bruce, T. (2011). *Early Childhood Education, 4th Edition*. Hodder education. Hachette UK.
- Bruner, J. (1986). *Actual minds. Possible Worlds*. Cambridge, MA: Harvard University Press.
- Burchinal, M. R., Cryer, D., Clifford, R. M., Howes, C. (2002). Caregiver training and classroom quality in child care centers. *Applied Developmental Science*, 6 (1), 2-11.
- Chandola, T., Heraclides, A., & Kumari, M. (2010). Psychophysiological biomarkers of workplace stressors. *Neuroscience & Biobehavioral Reviews*, 35(1), 51-7. doi: 10.1016/j.neubiorev.2009.11.005.
- Chida, Y., & Steptoe, A. (2009). Cortisol awakening response and psychosocial factors: A systematic review and meta-analysis. *Biological Psychology*, 80(3), 265-278.
- Chrousos, G. P. (2009). Stress and disorders of the stress system. *National Review of Endocrinology*, 5, 374-81.

- Clarke-Stewart, K. A., Vandell, D. L., Burchinal, M., O'Brien, M., McCartney, K. (2002). Do regulable features of child-care homes affect children's development. *Early Childhood Research Quarterly*, 17, 52-86.
- Collie, R. J., Shapka, J. D., Perry, N. E., & Martin, A. J. (2015). Teachers' beliefs about social-emotional learning: Identifying teacher profiles and their relations with job stress and satisfaction. *Learning and Instruction*, 39, 148-157.
- Corr, L., LaMontagne, A.D., Cook, K., Waters, E., Davis, E. 2015. Associations between Australian early childhood educators' mental health and working conditions: A Cross-sectional study. *Australasian Journal of Early Childhood*, 40(3), 69-78.
- Costa, P. L., Passos, A. M. & Bakker, A.B. (2014). Team work engagement: A model of emergence. *Journal of occupational and organizational psychology*, 87(2), 414-436.
- Danhof-Pont, M. B., van Veen, T., & Zitman, F. G. (2011). Biomarkers in burnout: A systematic review. *Journal of Psychosomatic Research*, 70(6), 505-24.
- Demerouti, E., Nachreiner, F., Bakker, A. B., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86(3), 499-512.
- De Vente, W., Olf, M., Van Amsterdam, J. G. C., Kamphuis, J. H., & Emmelkamp, P. M. G. (2003). Physiological differences between burnout patients and healthy controls: Blood pressure, heart rate, and cortisol responses. *Occupational & Environmental Medicine*, 60, i54-i61.
- Dmitrieva, N. O., Almeida, D. M., Dmitrieva, J., Loken, E., & Pieper, C. F. (2013). A day-centered approach to modeling cortisol: Diurnal cortisol profiles and their associations among U.S. adults. *Psychoneuroendocrinology*, in press.
- Early, D. M., Maxwell, K. L., Burchinal, M., Alva, S., Bender, R. H., Bryant, D., ... & Zill, N. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child development*, 78(2), 558-580.
- El-Sheikh, M., S. A. Erath, J. A. Buckhalt, D. A. Granger, and Mize. J. 2008. Cortisol and children's adjustment: The moderating role of sympathetic nervous system activity. *Journal of Abnormal Child Psychology*, 36(4), 601-611.
- Emery, D. W. and B. Vandenberg. 2010. Special education teacher burnout and ACT. *International Journal of Special Education*, 25(3), 119-131.
- Estola, E., Erkkilä, R., & Syrjälä, L. (2003). A Moral Voice of Vocation in Teachers' Narratives. *Teachers and Teaching: theory and practice* 9 (3), 239-256.

- Fekedulegn, D., Burchfiel, C. M., Violanti, J. M., Hartley, T. A., Charles, L. E., Andrew, M. E., & Miller, D. B. (2012). Associations of long-term shift work with waking salivary cortisol concentration and patterns among police officers. *Industrial Health*, 50(6), 476-86.
- Finnish Institute of Occupational Health (2010). Työ ja terveys Suomessa 2009 [Work and health in Finland 2009]. Sastamala: Vammala Press, 4-5.
- Fontaine, N. S., Torre, L. D., Grafwallner, R., & Underhill, B. (2006). Increasing quality in early care and learning environments. *Early Child Development and Care* 176 (2), 157-169.
- Fogel, A (1992). Movement and communication in human infancy: The social dynamics of development: *Human Movement Science* 11, 387-423.
- Fortunato, C. K., Dribin, A. E., Granger, D. A., & Buss, K. A. (2008). Salivary alpha-amylase and cortisol in toddlers: Differential relations to affective behavior. *Developmental Psychobiology*, 50(8), 807-18.
- Gable, S. L., & Haidt, J. (2005). What (and why) is positive psychology? *Review of General Psychology*, 9(2), 103-110.
- Greenberg, N., Carr, J. A., & Summers, C. H. (2002). Causes and consequences of stress. *Integrative and Comparative Biology*, 42(3), 508-516.
- Groenveld, M.G., Vermeer, H.J., van Ijzendoorn, M.H., Linting, M. (2012). Caregivers' cortisol levels and perceived stress in home-based and center-based childcare. *Early Childhood Research Quarterly*, 27(1), 166-175.
- Gunnar, M. R. & Cheatham, C. L. (2003). Brain and Behavior interface: Stress and developing brain. *Infant Mental Health Journal*, 24 (3), 195-211.
- Gunnar, M. & Quevedo, K. (2007). The Neurobiology of Stress and Development. *Annual Review of Psychology*, 58, 145-173.
- Hakanen, J. (2004). Työuupumuksesta työn imuun - työhyvinvointitutkimuksen ytimessä ja reuna-alueilla. [From burnout towards work engagement – Issues in the core of occupational health research] Helsinki: Finnish Institute of Occupational Health.
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, 43, 495-513.
- Hakanen, J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement, *Work & Stress*, 22(3), 224-241.
- Hakanen, J. J., Perhoniemi, R., & Toppinen-Tanner, S. (2008). Positive gain spirals at work: From job resources to work engagement, personal initiative and work-unit innovativeness. *Journal of Vocational Behavior*, 73, 78-91.
- Hakanen J. (2009a). Työn imua, tuottavuutta ja kukoistavia työpaikkoja Kohti laadukasta työelämää. [Work engagement, productivity, and flourishing



- workplaces Towards high-quality working life]. Report of the Finnish Institute of Occupational Health, Helsinki.
- Hakanen J. 2009b. Työn imu arviointimenetelmä. Työn imu -menetelmän (Utrecht Work Engagement Scale) käyttäminen, validointi ja viitetiedot Suomessa. Helsinki: Työterveyslaitos.
- Hakanen, J. J., Perhoniemi, R., & Bakker, A. B. (2014). Crossover of exhaustion between dentists and dental nurses. *Stress and Health*, 30(2), 110-121.
- Halbesleben, J. R., and A. R. Wheeler. 2008. The relative roles of engagement and embeddedness in predicting job performance and intention to leave. *Work & Stress*, 22(3), 242-256.
- Hall-Kenyon, K.M., Bullough, R.V., MacKay, K.L., & Marshall, E.E. (2014) Preschool teacher wellbeing: A review of the literature. *Early Childhood Education Journal*, 42(3), 153
- Hari, R., Järvinen, J., Lehtonen, J., Lonka, K., Peräkylä, A., Pyysiäinen, I., ... & Ylikoski, P. (2015). Ihmisen mieli [Human mind]. Helsinki. Gaudeamus.
- Heinämäki, L. (2008). Early childhood education in Finland. Potsdam: Liberales institut. Retrieved from:<http://www.fnf.org.ph/downloadables/Childhood%20Education%20in%20Finland.pdf>
- Hellhammer, D. H., Wüst, S., & Kudielka, B. M. (2009). Salivary cortisol as a biomarker in stress research. *Psychoneuroendocrinology*, 34, 163-171.
- Hidalgo, V., Almela, M., Villada, C., & Salvador, A. (2014). Acute stress impairs recall after interference in older people, but not in young people. *Hormones & Behavior*, 65(3), 264-272.
- Kinnunen, U., & Hättinen, M. (2005). Työuupumus ja jaksaminen työelämässä [Burnout and coping in working life.]. In U. Kinnunen, T. Feldt & S. Mauno (eds.) *Työ leipälajina Työhyvinvoinnin psykologiset perusteet* [Work as vocation. The basics of the Occupational psychology ], 38-55.
- Kinnunen, U., & Salo, K. (1994). Teacher stress: An eight-year follow-up study on teachers' work, stress, and health, *Anxiety, Stress, and Coping*, 7, 319-337.
- Kirschbaum, C., & Hellhammer, D. H. (1989). Salivary cortisol in psychobiological research: An overview. *Neuropsychobiology*, 22, 150-69.
- Klassen, R. M., & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology*, 102(3), 741-756.
- Kudielka, B. M., Gierens, A., Hellhammer, D. H., Wüst, S., & Schlotz W. 2012. Salivary cortisol in ambulatory assessment - Some dos, some don'ts, and some open questions. *Psychosomatic Medicine*, 74(4), 418-431.

- Kyriacou, C. (2001). Teacher stress: Directions for future research. *Educational Review*, 53, 27-35.
- Laine K. & Neitola M., (2002). Lasten syrjäytyminen päiväkodin vertaisryhmästä [Children's exclusion in peer relations in kindergarten], Suomen kasvatustieteellinen seura, Pinosalama Oy, Turku
- Lamb, M., E. (2000). The Effects of Quality of Care on Child Development. *Applied Developmental Science*. 4(3), 112-115.
- Langelaan, S., Bakker, A. B., Schaufeli, W. B., van Rhenen, W., & van Doornen, L. J. (2006). Do burned-out and work-engaged employees differ in the functioning of the hypothalamic-pituitary-adrenal axis. *Scandinavian journal of work, environment & health*, 339-348.
- Leroy, H., Anseel, F., Gardner, W. L., & Sels, L. (2012). Authentic leadership, authentic followership, basic need satisfaction, and work role performance: A cross-level study. *Journal of Management*, 0149206312457822.
- Liao, J., Brunner, E.J., Kumari, M. (2013) Is There an Association between Work Stress and Diurnal Cortisol Patterns Findings from the Whitehall II Study. *PLoS ONE*, 8(12) e81020. doi:10.1371/journal.pone.0081020
- Limm, H., Gündel, H, Heinmüller, M., Marten-Mittag, B., Nater, U. M., Siegrist, J., & Angerer, P. (2011). Stress management interventions in the workplace improve stress reactivity: A randomised controlled trial. *Occupational and Environmental Medicine*, 68(2), 126-33.
- Linley, P. A., S. Joseph, S. Harrington, & Wood. A. M. (2006). Positive psychology: Past, present and (possible) future. *The Journal of Positive Psychology*, 1(1), 3-16.
- Lopez, S., and C. Snyder. 2009. *The Oxford Handbook of Positive Psychology* (2 ed.). New York: Oxford University Press.
- Lupien S. J., McEwen, B. S., Gunnar, M. R. & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behavior and cognition. *Nature reviews neuroscience*, 10, 434-445.
- Määttä, S., Lehto, R., Nislin, M., Ray, C., Erkkola, M., Sajaniemi, N., & Roos, E. (2015). Increased health and well-being in preschools (DAGIS): rationale and design for a randomized controlled trial. *BMC public health*, 15(1), 402.
- Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., ... & Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child development*, 79(3), 732-749.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *MBI: The Maslach Burnout Inventory: Manual*. Palo Alto, CA: Consulting Psychologists Press.
- Maslach, C., Schaufeli, W. B. & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397-422.

- Maslach, C. & Leiter, M. P. (2008). *The truth about burnout: How organizations cause personal stress and what to do about it*. San Francisco, CA: John Wiley & Sons.
- Morgan, C. A., Cho, T., Hazlett, G., Coric, V., & Morgan, J. (2002). The impact of burnout on human physiology and on operational performance: A prospective study of soldiers enrolled in the combat driver qualification course. *Yale Journal of Biology & Medicine*, 75, 199-205.
- Mäki, U. (2014) Tieteenalat dialogissa.[Dialogue between disciplines] Tieteessä tapahtuu. 32 (2), 43
- Möttönen, L. and M. Hintsanen. 2011. Liittykö työstressin kokeminen yksilön temperamenttiin [Is work stress related to the individual temperament characteristics ], *Psykologia*, 46(4), 232-247.
- Nater, U., Rohleder, N., Schlotz, W., Ehlert, U., Kirschbaum, C., (2007). Determinants of the diurnal course of salivary alpha-amylase. *Psychoneuroendocrinology*, 32, 392–401
- Nater, U. M., & Rohleder, N. (2009). Salivary alpha-amylase as a non-invasive biomarker for the sympathetic nervous system: Current state of research. *Psychoneuroendocrinology*, 34(4), 486-496. doi: 10.1016/j.psyneuen.2009.01.014.
- NICHD Early Child Care Research Network. (1999). Child outcomes when child care center classes meet recommended standards for quality. *American Journal of Public Health*, 89(7), 1072-1077
- NICHD Early Child Care Research Network (2000). Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Psychology*, 4(3), 116-135.
- Nicolson, N.A. (2008). Measurement of cortisol. In Luecken, L & Gallo, L.C. (eds.) *Handbook of Physiological Research Methods in Health Psychology*. Thousand Oaks, CA: Sage Publications, Inc. 37-73.
- Nummenmaa, A. R., & Karila, K. (2006). Collaborative planning in a multi-professional day-care center – PBL as a strategy and script for learning. In Poikela, E., & Nummenmaa A.R. (Eds.), *Understanding problem based learning* (p. 221). Tampere: Tampere University Press.
- OECD. 2006. *Starting Strong II: Early Childhood Education and Care*. Paris: OECD.
- OECD. 2012. *Starting Strong III – A Quality Toolbox for Early Childhood Education and Care*. Paris: OECD.
- Onnismaa, E.-L., Tahkokallio, L., Lipponen, L. & Reunamo, J. (2013). The impact of educational background on the early attrition and job commitment among kindergarten teachers. Presentation at the EECERA Conference, Tallinn, Estonia
- Onnismaa, E. L., & Kalliala, M. (2010). Finnish ECEC policy: interpretations, implementations and implications. *Early Years*, 30(3), 267-277.

- Osgood, J. 2006. Deconstructing professionalism in early childhood education: Resisting the regulatory gaze. *Contemporary issues in early childhood*, 7(1):5-14.
- Pascal, C., T. Bertram, F. Ramsden, J. Georgeson, M. Saunders, and C. Mould.(1995). Evaluating and developing quality in early childhood settings: A professional development programme. (Centre for early Childhood Research Worcester College of Higher Education ed.). United Kingdom: Henwick Grove Worcester
- Perhoniemi, R., & Hakanen, J. (2013). Työn imun ja ystävällisyyden siirtymisen vaikutus työpareilla. [Contagion of work engagement and kindness among co-workers] *Psykologia*, 48(02), 88-101.
- Phillipsen, L. C., Burchinal, M. R., Howes, C. & Cryer, D. (1997) The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly*, 12, 281-303.
- Pierce, J.L., & Gardner, D.G. (2004). Self-Esteem within the work and organizational context: A review of the organization-based self-esteem literature. *Journal of Management*, 30(5), 591-622.
- Pietarinen, J., Soini, T., and Pyhältö, K. (2008). Pedagoginen hyvinvointi – uutta ja tuttua koulun arjessa. [Pedagogical well-being – new and familiar in everyday school life]. In Lappalainen, K., Kuittinen, M., & Meriläinen, M. (eds.), *Pedagoginen hyvinvointi [Pedagogical well-being]* (pp. 53-67). Jyväskylä: Finnish Educational Research Association.
- Piha, S., & Rantala, M. J. (2015). Todellisuuden tutkimiseen tarvitaan vain yhtä tiedettä. [For investigating the reality, only one science is needed]. *Tieteessä tapahtuu*, 33(3).
- Pihlaja, P. (2006). Erytisryhmän tunnuspiirteet. [Characteristics of the special group]. In P. Pihlaja & E. Kontu (Eds.) *Arjen moninaisuutta. Erytisryhmät päiväkodissa. [Everyday diversity. Special groups at day care.]* Report of the Stakes: Helsinki.
- Prieto, L. L., Soria, M. S., Martínez, I. M., & Schaufeli, W. (2008). Extension of the Job Demands-Resources model in the prediction of burnout and engagement among teachers over time. *Psicothema*, 20(3), 354-360.
- Porges, S. W. (1992). Vagal tone: a physiologic marker of stress vulnerability. *Pediatrics*, 90(3), 498-504.
- Pruessner, J. C., Kirschbaum, C., Meinlschmid, G., Hellhammer, D. H. (2003). Two formulas for the computation of the area under the curve represent measures of total hormone concentration versus time-dependent change. *Psychoneuroendocrinology*, 28(7), 916-931
- Rantala, T., & Määttä, K. (2011). Ten thesis of the joy of learning at primary schools. *Early Child Development and Care*, iFirst. doi: 10.1090/03004430.2010.545124.

- Raver, C. C., Jones, S. M., Li-Grining, C. P., Zhai, F., Metzger, M. W., & Solomon, B. (2009). Targeting children's behavior problems in preschool classrooms: A cluster-randomized controlled trial. *Journal of Consulting and Clinical Psychology, 77*, 302-316.
- Roffey, S. (2012). Pupil well-being – teacher well-being: Two sides of the same coin. *Educational & Child Psychology, 29*(4), 8-17.
- Rohleder, N., U. M. Nater, J. M. Wolf, U. Ehlert, & Kirschbaum, C. (2004). Psychosocial stress-induced activation of salivary alpha-amylase: an indicator of sympathetic activity. *Annals of the New York Academy of Sciences, 1032*(1), 258-263.
- Rohleder, N., & Nater, U. M. (2009). Determinants of salivary alpha-amylase in humans and methodological considerations. *Psychoneuroendocrinology, 34*(4), 469-485. doi: 10.1016/j.psyneuen.2008.12.004.
- Suhonen, E. & Sajaniemi, N. (2012). Enhancing children's learning through intent participation - understanding relationship between pedagogical sensitivity and stress regulation. Technical creativity in schools' curricula with the form of project learning "From idea to the product" - from the kindergarten to technical faculty. Ljubljana: Ministry of Education, Science, Culture and Sport, s. 56-61
- Sajaniemi, N., Suhonen, E., Kontu, E., Rantanen, P., Lindholm, H., Hyttinen, S., & Hirvonen, A. (2011). Children's cortisol patterns and the quality of the early learning environment. *European Early Childhood Education Research Journal, 19*(1), 45-62.
- Sajaniemi, N., Suhonen, E., Kontu, E., Lindholm, H., & Hirvonen, A. (2012). Stress reactivity of six-year-old children involved in challenging tasks. *Early Child Development and Care, 182*(2), 175-189.
- Sajaniemi, N., Suhonen, E., Hotulainen, R., Törmänen, M., Alijoki, A., Nislin, M., & Kontu, E. (2014). Demographic Factors, Temperament and the Quality of the Preschool Environment as Predictors of Daily Cortisol Changes among Finnish Six Year Old Children. *European Early Childhood Education Research Journal, 22*(2), 286-306
- Sajaniemi, N., E. Suhonen, M. Nislin, J.E. Mäkelä. (2015). Stressin säätely. Kehityksen, vuorovaikutuksen ja oppimisen ydin. [Stress Regulation. The core of development, interaction and learning]. Jyväskylä: PS-Kustannus.
- Sapolsky, R. M. (2000). Stress hormones: Good and bad. *Neurobiology of Disease 7*(5),540-2.
- Schaufeli, W. B., Salanova, M., Gonzalez-Roma, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies, 3*, 71-92.

- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25, 293-315.
- Schaufeli, W.B., Bakker, A.B. & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement*, 66, 701-716.
- Schaufeli, W.B., Leiter, M.P. & Maslach, C. (2008). Burnout: 35 years of research and practice, *Career Development International*, 14(3), 204-220.
- Schaufeli, W. B., Taris, T. W., & van Rhenen, W. (2008). Workaholism, burnout, and work engagement: Three of a kind or three kinds of employee well-being *Applied Psychology: An International Review*, 57(2), 173-203.
- Schaufeli, W. B., Bakker, A. B., & van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *Journal of Organizational Behavior*, 30, 893-917.
- Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the Job Demands-Resources Model: Implications for improving work and health. In *Bridging occupational, organizational and public health* (pp. 43-68). Springer Netherlands.
- Schulz, P., Kirschbaum, C., Pruessner, J., & Hellhammer, D. (1998). Increased free cortisol secretion after awakening in chronically stressed individuals due to work overload. *Stress Medicine*, 14, 91-97.
- Schutte, N., Toppinen, S., Kalimo, R., & Schaufeli, W. (2000). The factorial validity of the Maslach Burnout Inventory-General Survey (MBI-GS) across occupational groups and nations. *Journal of Occupational and Organizational psychology*, 73(1), 53-66.
- Siegrist, J., Starke, D., Chandola, T., Godin, I., Marmot, M. ,Niedhammer, I. ,& Peter, R.. (2004). The measurement of effort-reward imbalance at work: European comparisons. *Social Science & Medicine*, 58, 1483-1499.
- Seligman, M., & Csikszentmihalyi, M.. (2000). Positive Psychology: An Introduction. *American Psychologist*, 55(1), 5 - 14.
- Selye, H. (1950). Stress and the general adaptation syndrome. *British medical journal*, 1(4667), 1383.
- Seppälä, P., Mauno, S., Feldt, T., Hakanen, J., Kinnunen, U., Tolvanen, A., & Schaufeli, W.B. (2009). The construct validity of the Utrecht Work Engagement Scale: Multisample and longitudinal evidence. *Journal of Happiness Studies*, 10, 459-481.
- Sheridan, S. (2009). Discerning pedagogical quality in preschool. *Scandinavian Journal of Educational Research*, 53(3), 245-261.
- Sims, M. (2007). The determinants of quality care: Review and research report. In E. Hill, B. Pocock & A. Elliot (Eds.), *Kids Count: Better early*

- education and care in Australia. (pp. 220 - 241). Sydney: University of Sydney Press.
- Sims, M., Forrest, R., Semann, A., & Slattery, C. (2014). Conceptions of early childhood leadership: driving new professionalism . *International Journal of Leadership in Education*, (ahead-of-print), 1-18.
- Sims, M., & Waniganayake, M. (2015). The Role of Staff in Quality Improvement in Early Childhood. *Journal of Education and Training Studies*, 3(5), 187-194.
- Steptoe, A., Cropley, M., Griffith, J., & Kirschbaum, C. (2000). Job strain and anger expression predict early morning elevations in salivary cortisol. *Psychosomatic Medicine*, 62, 286-292.
- Stone, A. A., Schwartz, J. E., Smyth, J., Kirschbaum, C., Cohen, S., Hellhammer, D., & Grossman, S. (2001). Individual differences in the diurnal cycle of salivary free cortisol: A replication of flattened cycles for some individuals. *Psychoneuroendocrinology*, 26(3), 295-306.
- Strain, P. S., & Joseph, G.E.(2004). Engaged supervision to support recommended practices for young children with challenging behavior. *Topics in early childhood special education*, 24(1), 39-50.
- Suhonen, E. 2009. Erityistä tukea tarvitsevan taaperon sopeutuminen päiväkotiryhmään. Monitapaustutkimus vuorovaikutussuhteista ja niiden rakentumisesta. [How toddlers with special needs adjust to the day care setting. A multiple case study of how the relationships with adults and children are built.] Doctoral Thesis: Helsinki University Press.
- Suhonen, E. & Nislin, M. (2012) Inclusive models in early childhood intervention in Finland. Inkluderende spesialundervisning. Haustätter, R. S. (ed.). Bergen: Fagbokforlaget, 161
- Takai, N., Yamaguchi, M., Aragaki, T. ,Eto, K. ,Uchihashi, K., &Nishikawa. Y. (2004). Effect of psychological stress on the salivary cortisol and amylase levels in healthy young adults. *Archives of oral biology*, 49(12), 963-968.
- Torrente, P., Salanova, M., Llorens, S., & Schaufeli, W. B. (2012). Teams make it work: How team work engagement mediates between social resources and performance in teams. *Psicothema*, 24(1), 106-112.
- Totterdell, P., Kellet, S., Teuchmann, K. & Briner, R. (1998). Evidence of mood linkage in work groups. *Journal of Personality and Social Psychology*, 74, 1504-1515.
- Turner, R. J., & Sugiya. H. (2002). Understanding salivary fluid and protein secretion. *Oral diseases*, 8(1), 3-11.
- Vandell, D. L., & Wolfe, B. (2000). Child care quality: Does it matter and does it need to be improved Special Report No. 78: Institute of Research on Poverty. Retrieved from:  
<http://www.irp.wisc.edu/publications/sr/pdfs/sr78.pdf>.

- Vygotsky, L. S. (1978). *Mind in society* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Cambridge, MA: Harvard University Press.
- Wilcox, R. R, Granger, D. A., Szanton, S., & Clark, F. (2014). Diurnal patterns and associations among salivary cortisol, DHEA and alpha-amylase in older adults. *Physiology and Behavior*, 129, 11-16.
- Wilson, E.O. (2001). *Konsilienssi. Tiedon yhtenäisyys.*[Consilience. The Unity of Knowledge.]. Helsinki: Terra Cognita.
- Xanthopoulou, D., Bakker, A. B., Demerouti, E., Schaufeli, W. B. (2009). Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of Occupational and Organizational Psychology*, 82, 183-200.
- Ylitapio-Mäntylä, O., Uusiautti, S., & Määttä, K. (2012). Critical viewpoint to early childhood education teachers' well-being at work. *International Journal of Human Sciences*, 9(1), 458-483.
- Zhai, F, Cybele Raver, C., & Li-Giring, C. (2011). Classroom-based interventions and teachers' perceived job stressors and confidence: Evidence from a randomized trial in Head Start setting. *Early Childhood Research Quarterly*, 26, 442-452.