Aus dem Institut für Arbeits-, Sozial- und Umweltmedizin der
Heinrich-Heine-Universität Düsseldorf
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The impact of the COVID-19 pandemic on the working conditions and health of early childhood professionals

Dissertation

zur Erlangung des Grades eines Doktors der Public Health
der Medizinischen Fakultät der Heinrich-Heine-Universität Düsseldorf

vorgelegt von
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2023

Als Inauguraldissertation gedruckt mit Genehmigung der
Medizinischen Fakultät der Heinrich-Heine-Universität Düsseldorf

gez.:
Dekan: Prof. Dr. med. Nikolaj Klöcker
Erstgutachter: Prof. Dr. med. Peter Angerer
Zweitgutachter: Prof. Dr. Reinhard Pietrowsky

Parts of this dissertation were published:

Gritzka, S., Angerer, P., Pietrowsky, R., & Diebig, M. (2022). The Impact of the Implementation of Preventive Measures Due to COVID-19 on Work Design and Early Childhood Professionals' Well-Being-A Qualitative Study. *International Journal of Environmental Research and Public Health*, *19*(3). https://doi.org/10.3390/ijerph19031739

Gritzka, S., Angerer, P., Erschens, R., & Diebig, M. (2023). Der Zusammenhang von gesundheitskritischen Arbeitsbelastungen und somatischen Symptomen bei frühpädagogischen Fachkräften in der Kindertagesbetreuung während der COVID-19-Pandemie [The Relationship of Work Stress and Somatic Symptoms Among Early Childhood Professionals During the COVID-19 Pandemic]. *Psychotherapie, Psychosomatik, medizinische Psychologie.* Advance online publication. https://doi.org/10.1055/a-2055-1738

Gritzka, S., Angerer, P., & Diebig, M. (2024). The Mediating Role of Fear of COVID-19 in the Association between COVID-19-Related Work Stressors and Subjective Well-being: Path Analysis by Cross-sectional Evidence in the Child Care Sector across Three Samples. *Journal of occupational and environmental medicine*, *66*(1), 78–91. https://doi.org/10.1097/JOM.0000000000002997

Zusammenfassung

Die COVID-19-Pandemie stellte die Kindertagesbetreuung und frühpädagogische Fachkräfte vor ungeahnte Herausforderungen. Nach einem Lockdown in Nordrhein-Westfalen wurden im Juni 2020 unter präventiven Maßnahmen die Einrichtungen schrittweise wiedereröffnet. Dies führte zu Veränderungen in den täglichen Arbeitsabläufen. Angesichts der kritischen Arbeitsbedingungen für frühpädagogische Fachkräfte, untersucht diese Dissertation, wie sich ihre Arbeit und Gesundheit während der COVID-19-Pandemie gestaltete. Innerhalb dieser kumulativen Dissertation wurden 27 qualitative Interviews mit Leitungen von Kindertagesstätten im Juni 2020 durchgeführt. Diese Interviews erforschten explorativ die Umsetzung und Wahrnehmung der präventiven Maßnahmen, deren Auswirkungen auf die Arbeitsbedingungen und deren Einfluss auf das allgemeine Wohlbefinden. Darüber hinaus wurden zwischen Juni 2020 und Mai 2021 drei quantitative Umfragen durchgeführt, um arbeitsbedingten Stress, neue Stressoren im Zusammenhang mit der Pandemie und die psychische und körperliche Gesundheit zu erfassen. Die qualitativen Ergebnisse deuten darauf hin, dass die Umsetzung der präventiven Maßnahmen durch das hohe Engagement der Fachkräfte zwar realisierbar war, den Arbeitsalltag jedoch grundlegend änderten. Bereits vorhandene schwierige Arbeitsbedingungen wurden verschärft. Darüber hinaus wurde beschrieben, dass das Wohlbefinden durch psychische und physische Belastung beeinflusst wurde, wobei sich Wut, Frustration, emotionale Erschöpfung und die Angst vor Infektion zeigten. Insbesondere die Angst vor COVID-19 spielte eine wichtige Rolle, da sie als Mediator zwischen neuen COVID-19-bezogenen Stressoren und dem subjektiven Wohlbefinden in den quantitativen Daten identifiziert wurde. Die quantitativen Ergebnisse bestätigen weiter eine signifikant niedrigere Prävalenz der psychischen als auch der somatischen Gesundheit bei frühpädagogischen Fachkräften im Vergleich zur deutschen Allgemeinbevölkerung während der Pandemie. Überraschenderweise wurde jedoch eine ähnlich hohe Prävalenz von Arbeitsstress im Vergleich zu Studien vor der Pandemie beobachtet. Arbeitsstress vervierfachte das Chancenverhältnis, mäßig bis stark ausgeprägte somatische Symptome zu erleben. Diese Forschung beleuchtet die komplexen Dynamiken der Kindertagesbetreuung während der Pandemie und zeigt die Erfahrungen und Herausforderungen auf. Die Dissertation dient als wichtige Ressource für Politik, Praktiker:innen und Forschende, die die Arbeitsbedingungen und die Gesundheit dieser systemrelevanten Berufsgruppe in zukünftigen Krisensituationen verbessern möchten.

Summary

The COVID-19 pandemic posed unprecedented challenges for the field of early childhood education and care (ECEC) and early childhood professionals (ECPs). Following a lockdown, the gradual reopening in June 2020 in North Rhine-Westphalia (NRW) of ECEC facilities brought changes to the daily work routines of ECPs, as preventive measures were adopted. Considering that ECPs have long faced challenging working conditions, this dissertation aimed to investigate how their work and health were further affected during the COVID-19 pandemic. In this cumulative dissertation, 27 qualitative interviews were conducted with child care managers in June 2020. These interviews explored the implementation and perception of preventive measures, their impact on working conditions, and their influence on overall well-being. Additionally, three quantitative surveys were administered between June 2020 and May 2021 to assess work-related stress, new stressors arising from the pandemic, and the mental and physical health of ECPs. The qualitative findings suggest that the implementation of preventive measures, while feasible due to the commitment of ECPs, fundamentally altered the work of ECPs. Pre-existing challenging working conditions appear to have been exacerbated. Furthermore, it was described that well-being was impacted by psychological and physical demands, with anger, frustration, emotional exhaustion, and fear of infection being just some of the reported strain outcomes. In particular, the fear of COVID-19 played an important role as it mediated the association between new COVID-19-related stressors and subjective well-being. The quantitative results confirm a significantly lower level of both psychological and physical health among ECPs compared to the German general population during the pandemic. However, contrary to expectations, a similarly high level of work stress was observed compared to pre-pandemic studies. The experience of work stress quadrupled the odds of experiencing moderate-to-high somatic symptom severity. This research sheds light on the complex dynamics of the ECEC sector during the pandemic and contributes knowledge into the experiences and challenges faced by ECPs. It serves as a critical resource for policymakers, practitioners, and researchers seeking to enhance the working conditions and health for this essential workforce in future crisis scenarios.

List of abbreviations

COVID-19	Coronavirus Disease 2019
DJI	German Youth Institute (*Deutsches Jugendinstitut*)
ECEC	Early Childhood Education and Care
ECP	Early Childhood Professional
ERI	Effort-Reward Imbalance
ISCED	International Standard Classification of Education
MKFFI[1]	Ministry for Children, Families, Refugees and Integration of the state North Rhine-Westphalia (*Ministerium für Kinder, Familie, Flüchtlinge und Integration des Landes Nordrhein-Westfalen*)
NRW	North Rhine-Westphalia (*Nordrhein-Westfalen*)
OHS	Occupational Health and Safety
PHQ-15	Patient Health Questionnaire-15
PPE	Personal Protective Equipment
RKI	Robert Koch Institute (*Robert Koch-Institut*)
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
STIKO	Permanent Vaccination Commission (*Ständige Impfkommission*)
WHO	World Health Organization
WHO-5	WHO-Five Well-Being Index

[1] At the beginning of the research project in June 2020 and during the data collection phases, the responsible ministry was known as the MKFFI. However, following the May 2022 elections in North Rhine-Westphalia, it was renamed to MKJFGFI, which stands for the 'Ministry for Children, Youth, Family, Equality, Refugees, and Integration of the state of North Rhine-Westphalia,' or in German, 'Ministerium für Kinder, Jugend, Familie, Gleichstellung, Flucht und Integration des Landes Nordrhein-Westfalen.

Table of contents

1 Introduction

1.1 Background

The COVID-19 pandemic has impacted workplaces around the globe, leading to unprecedented changes. With the obligations to shutdown, the emergence of new work-from-home norms, increased focus on health and safety protocols, and the adoption of new technologies, the pandemic has fundamentally altered the way people work. While all employees experienced changes in their work environment to varying degrees, some occupational groups are recognized as essential or frontline workers. These workers maintain the proper functioning of society due to their ability to perform critical functions (The Lancet, 2020). Early childhood professionals (ECPs) occupy a distinct position among essential workers due to their mandatory on-site presence, their responsibility for caring for infants who may lack an understanding of COVID-19 and the capacity to comply with public health guidelines. Additionally, ECPs play a crucial role in supporting the work of other essential workers by providing care for their children. After an initial shutdown in March 2020, access to early childhood education and care (ECEC) was restored in North Rhine-Westphalia (NRW) in June 2020. As a result, ECPs were forced into a delicate balancing act of reopening ECEC facilities under strict occupational health and safety (OHS) measures while taking care of children and protecting their own health.

The global closure of ECEC services, followed by gradual reopening with accompanying OHS measures during the COVID-19 pandemic, represents an unprecedented event in the history of welfare states (Blum & Dobrotić, 2021). This sudden shift in work arrangements may change working conditions and individuals' perception of work demands, ultimately leading to implications for the well-being and health of ECPs. This holds particular importance as the working conditions in ECEC have been reported as psychologically and physically demanding for decades prior to the pandemic (Jungbauer & Ehlen, 2015; Rudow, 2004).

In view of ECPs' general high societal and economic value (Fritschi & Oesch, 2008) and their relevance during the COVID-19 pandemic, protecting the health and safety of ECPs should be regarded as a key priority (Murray, 2020). Against this background, this dissertation - embedded in the research project "Arbeitsmedizinische KiTa-Studie" - seeks to uncover the work demands as well as the mental and physical

health of German ECPs during the COVID-19 pandemic. This is achieved through a combination of qualitative and quantitative approaches. In the introduction, the occupational profile and key figures of the workforce including structural difficulties will be presented (chapter 1.2). Further, work-related stress and strain of ECPs will be explained in detail (chapter 1.3). Based on this presentation of ECPs' workplace, the extensive COVID-19 regulations, and developments within the ECEC sector will be highlighted using the example of NRW (chapter 1.4). This is followed by a short summary of the COVID-19 outbreak's impact on OHS (chapter 1.5). Finally, the aims of this dissertation will be outlined (chapter 1.6).

1.2 Occupational profile and key figures of early childhood professionals in Germany

The profession of ECPs are among professions in education whereas the term ECEC encompasses the entire field of education for all children not yet of school age, thus the category 01 and 02 of the international standard classification of education (ISCED) (Autor:innengruppe Bildungsberichterstattung, 2022). Generally, ECEC refers to a wide range of worldwide educational services designed to meet the needs of children from birth to school. These services encompass various types, such as preschools, kindergartens, and elementary schools, and may extend to the initial stages of primary education. The German ECEC encompass both child care centers ("Kindertageseinrichtungen") as well as family day care ("Kindertagespflege") (Autor:innengruppe Bildungsberichterstattung, 2022).

As of March 1, 2020, a total of 682,942 employees were employed in German child care centers, including pedagogical, management and administrative staff (Statistisches Bundesamt, 2022b). In contrast, in 2010, there were only 423,438 employees, indicating an increase of 61.3% (Statistisches Bundesamt, 2022b). In the case of NRW, there has been a similarly strong increase, from 97,205 employees in ECEC in 2011 to 147,367 in 2021, representing a 50.2% increase (Statistisches Bundesamt, 2021). This growth trend has been observed for years at a consistently high level. Additionally, 44,782 ECPs worked in German family day care (96.1% female, 3.9% male) in 2020 (Statistisches Bundesamt, 2020). The gender breakdown of ECPs in child care centers in Germany is 92.5% female and 7.5% male, while in NRW it is 93.5% female and 6.5% male (Bock-Famulla et al., 2021). This gender-specific distribution has seen a slight change in recent years, with the number of male ECPs more than tripling since

2009 (Statistisches Bundesamt, 2022a). Yet, it remains a female-dominated profession despite current professional policy activities to attract more men to ECEC. In contrast, among primary school teachers, 18.8% are male, and among secondary school teachers, 32.5% are male (Bock-Famulla et al., 2021). In 2020, 2.6% of ECPs employed in Germany were aged under 20 years, 23.4% between 20 – 30 years, 23.7% between 30 – 40 years, 21.9% between 40 – 50 years, 21% between 50 – 60 years and 7.5% above 60 years. The mean age for ECPs in general was 40.7 years, while for leadership positions, it was 48 years (Statistisches Bundesamt, 2020). The workforce of ECPs is becoming increasingly older due to demographic changes (Schneiders & Schönauer, 2022). However, the majority of ECPs (53%) expect that they won't be able to continue their careers until reaching retirement age due to health-related issues (Losch, 2018).

The number of apprentices has doubled since 2007/08 from just under 21,000 to around 43,000 apprentices (2020/21) in Germany (Autor:innengruppe Bildungsberichterstattung, 2022). The growth in the number of employees and apprentices may be attributed to increased staffing needs. This increase follows the introduction of a legal entitlement to attend ECEC for children as young as one, which came into effect on August 1, 2013. Previously, this entitlement only existed for children aged three and older, a regulation in place since 1996 (Sozialgesetzbuch §24, 2013). For example, the attendance of children under the age of three in ECEC was only 7.0% in 2007 (86.5% for children aged three to six years), but it increased to 29.2% (91.2% for children aged three to six years) by 2020 (Bock-Famulla, 2008; Bock-Famulla et al., 2021). Thus, the ECEC attendance has particularly increased in the younger age group. However, there is still a gap as 49.4% of parents express a desire for ECEC attendance for their children in this age group (Bundesministerium für Familie, Senioren, Frauen und Jugend, 2020). Furthermore, the demand of ECEC attendance is projected to reach 53% by 2030 (Bock-Famulla et al., 2021). This highlights the noteworthy shortage of ECPs in Germany (Bock-Famulla et al., 2022). Facilities lacking an adequate number of qualified staff struggle to effectively carry out their educational mission in a child-friendly manner. In fact, they are often only able to provide care for the children (Klusemann et al., 2020). The Bertelsmann Foundation's State Report on ECEC shows that various quality characteristics, such as staffing ratios, vary widely both between and within federal states (Bock-Famulla et al., 2021). A good structural child care quality positively influences children's social and emotional development (Burchinal et al., 2000) such as their pro-social behavior (Camehl & Peter, 2017). For a favorable

staffing ratio, the Bertelsmann Foundation recommends that one ECP is responsible for a maximum of three children under the age of three and a maximum of 7.5 children over the age of three (Bock-Famulla et al., 2021). However, because of a shortage of personnel, it is challenging to meet the scientifically recommended staffing ratio. On a national average, the mean staffing ratio for children under the age of 3 is $M = 3.8$, and for children above three years, it is $M = 8.1$ (Bildungsbericht, 2022).

In officially registered ECEC facilities, 73% of children are observed to have insufficient staffing ratios, failing to meet scientifically recommended standards. This problem is more pronounced among children under the age of three (78%) compared to those above the age of three (68%) (Bock-Famulla et al., 2021). As ECEC attendance for children under three years old continues to expand, the shortage of skilled labor in this profession is expected to worsen (Bock-Famulla et al., 2022). Additional factors exacerbating the staff shortage include the upcoming legal mandate for full-day care in primary schools from 2026 and the retirement of older employees. Considering the anticipated decline in the labor supply, the recruitment of ECPs will face great challenges in the future (Autor:innengruppe Bildungsberichterstattung, 2022). Simulation calculations indicate that by 2030, Germany could face a shortage of skilled workers ranging from 28,800 to 265,700, with NRW experiencing a shortage of 10,400 to 67,400 skilled workers (Bock-Famulla et al., 2021). These varying numbers are influenced by different scenarios, which depend on the anticipated attendance rates of children, staffing ratios, and personnel capacities for management tasks. To reduce this shortage, an increase of 128% in new entrants must be achieved by attracting lateral entrants and enhancing training capacities (Bock-Famulla et al., 2021). Currently, one of the most popular training options is state-regulated vocational education and training, which is offered at vocational schools, academies, and vocational colleges, among others. However, this traditional training is an unremunerated school-based training (König et al., 2018). Although new mixed forms of training with paid practice-integrated parts have recently emerged, there remains a need for expanding training capacity, enhancing training quality, and increasing the overall attractiveness of the training (Klusemann et al., 2020). A representative employer survey shows above-average recruitment difficulties in ECEC. While there are typically eleven applicants for job postings in other professions, there are only five for ECEC positions. In addition to a low number of applicants, the lack of qualifications of the applicants represents an issue (Warning, 2020).

There is an urgent need to enhance the appeal of this profession for both newcomers and existing personnel. Currently, 36.5% of ECPs express intentions to change jobs, and 25.7% are contemplating leaving the profession altogether (Meyer & Alsago, 2021). Hence, this professional group experiences high turnover rates (Warning, 2020). This trend can be partly attributed to ECPs' below-average salaries (Gambaro et al., 2021), with 76% expressing dissatisfaction with their compensation (Lübker & Herrberg, 2022).

Overall, this chapter highlighted that the profession of ECPs appears to be a thriving sector, yet still one that faces structural difficulties. There are challenges especially related to a shortage of personnel, an increasingly aging workforce, a poor staff-to-child ratio, high turnover, and fluctuation rates as well as below-average pay. In addition to these structural and organizational difficulties, specific work-related demands that also affect the employees characterize the everyday work life of ECPs. Thus, the following chapter delves into the work stress and strain experienced by ECPs prior to the COVID-19 pandemic.

1.3 Work stress and strain of early childhood professionals prior to the COVID-19 pandemic

Historically, research on occupational stress within the education field has predominantly centered on primary and secondary education professionals, with ECPs being largely overlooked (Hall-Kenyon et al., 2014). As presented, the ECEC sector has expanded; likewise, research has expanded. The increased research interest over the past decade, examining working conditions and their impact on ECPs' health, underscores the growing recognition of the value of ECPs' work and the importance of prioritizing a healthy and safe workplace for them (Cumming, 2017).

However, prior to the COVID-19 pandemic, studies had already highlighted the presence of work-specific psychological and physical stressors in ECEC (Rudow, 2017). Various work organization and work psychology models have been developed to explain the occurrence of work stress and its connection to adverse health outcomes. These models include, among others, the Job Demand-Control Model (Karasek, 1979) and its extension, the Job Demand-Control-Support Model (Johnson & Hall, 1988; Johnson et al., 1989) (referred to in study 1), as well as the Effort-Reward Imbalance Model (Siegrist et al., 2004) (referred to in study 2). Generally, stress research often distinguishes between stressors (i.e., conditions and demands that trigger

subsequent reactions), perceived stress (i.e., an individual's perception and appraisal of the stressor), and strains (i.e., psychological, physiological, social and behavioral outcomes) (Bliese et al., 2017; Hurrell et al., 1998). This approach is also reflected in the most widely used model within German occupational science: the stress(or)-strain model (Rohmert & Rutenfranz, 1975). This model describes the relationship between the stress at the workplace ("Belastung") and the resulting mental and physical strain ("Beanspruchung") experienced by workers. Thereby, *stress e*ncompasses all external factors that impact an employee. *Strain*, on the other hand, refers to the respective outcomes of stress experienced by individuals, which are influenced by internal factors like general health, age, gender, enduring and momentary conditions, including individual coping strategies, as well as personal experience and motivation (Schaper, 2019). Under this definition, stress and strain are described in a value-neutral way as inherent aspects of all work processes. They can exert both short-term and long-term effects on employees, either enhancing or impairing their well-being. Therefore, moderate levels of strain can result in positive stimulation and enhanced performance, whereas excessive strain can lead to fatigue, errors, and health problems (Neuner, 2016). The terms psychological stress and strain were included in the European standard DIN EN ISO 10075-1 describing guidelines for work design regarding workload (Demerouti et al., 2012; Nachreiner & Schütte, 2018). In this context, external stressors that affect employees originate from working conditions that can be classified into: (1) the work tasks, (2) the work equipment, (3) the work environment (including the social environment and society), (4) the work organization, and (5) the work station (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, 2008). Several meta-analyses and meta-analytical reviews, including longitudinal designs, have established the relationship between work stressors and psychological as well as physical health (Niedhammer et al., 2021; Nixon et al., 2011; Stansfeld & Candy, 2006). Figure 1 provides an overview of the connection between stress(or) and strain. It is essential to recognize the diversity among ECEC facilities and the varying resources that ECPs bring to their specific work settings. Consequently, what may be considered strain for one individual (e.g., handling multiple work tasks) can also serve as a resource for another (Bloechliger & Bauer, 2016). Moreover, it should be noted that most studies have been conducted in child care centers, and there is limited available literature on family care providers.

The following sections will provide an overview of scientific findings regarding: (1) work tasks, (2) work equipment and work stations, (3) work environment, (4) work organization as well as (5) the resulting strain outcomes among ECPs.

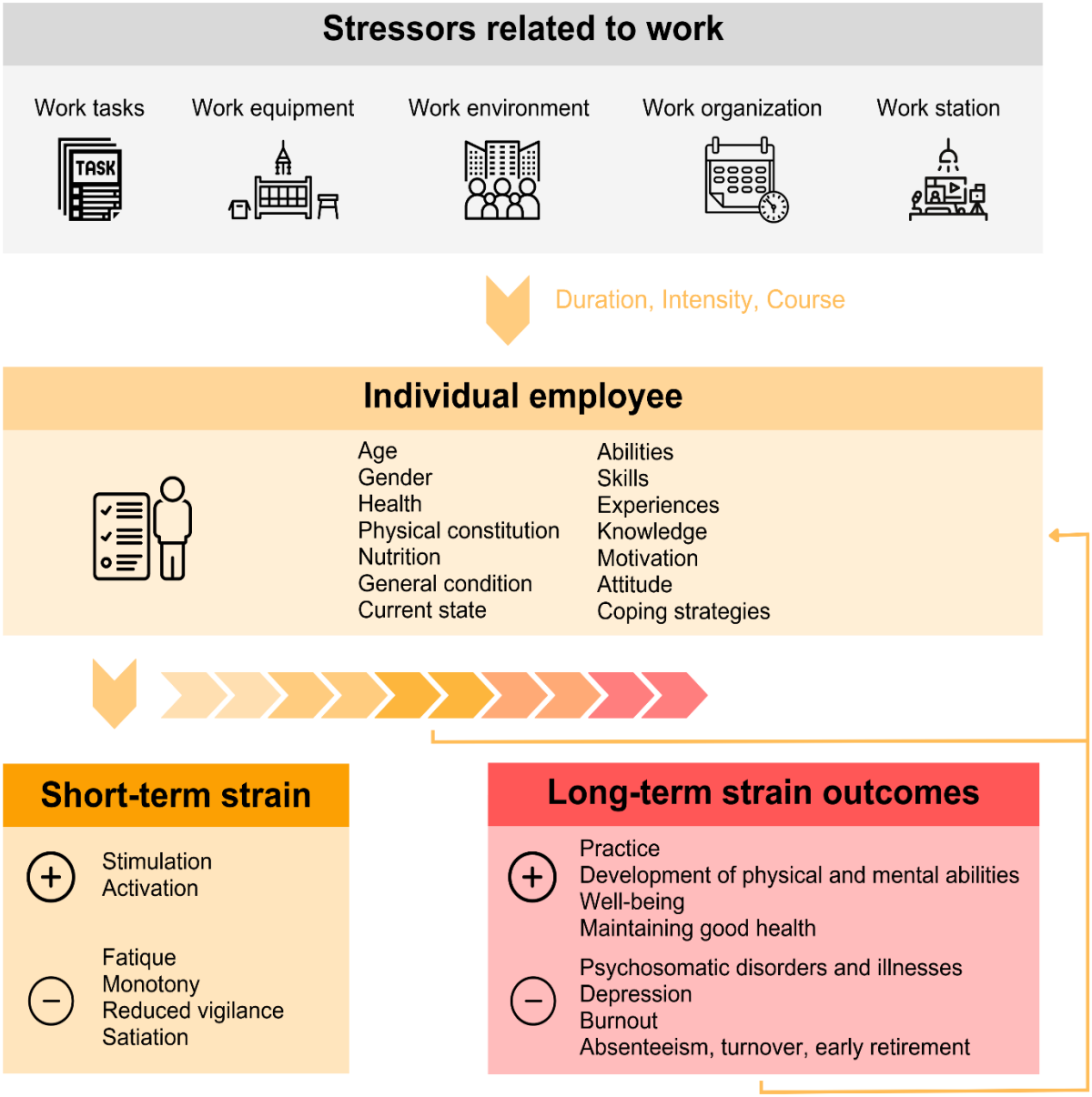

Fig. 1. Simplified representation of the stress(or)-strain model based on the representation in Joiko et al. (2010)

1.3.1 Work tasks

The work of ECPs is characterized by task variety. This encompasses tasks, such as education, training, and care of children, as well as cooperation with parents, caregivers and schools, observations, documentation, assessments of development, preparation and implementation of development talks, quality management, creation and updating of the educational concept, and language education (Rudow, 2017). In

German studies, it was reported that 96% of ECPs (Darius et al., 2023), respectively 92% of ECPs (Rudow, 2004) rated the multitude of tasks to be the most prevalent source of stress. The multitude of tasks associated with the roles of ECPs necessitates the adoption of various job roles, which can ultimately lead to challenging role conflicts (Nagel-Prinz & Paulus, 2012). In recent years, ECPs reported increasing stress levels due to the rising number of external projects, including language support, theme groups, appointments with reading or motor therapists, sports groups, as well as religious services. Furthermore, some non-pedagogical tasks (e.g., dusting and dishwashing) have been added to their work tasks (Rudow, 2017). Additionally, ECPs are burdened with simultaneous tasks as they take care for a large number of children with various needs at the same time (Losch & Schulze, 2016), which makes the accomplishment of tasks complex (Liu & Li, 2012). Scholars found that ECPs have to perform simultaneous tasks for an average of 47% of their daily work time (Kusma et al., 2011). Hence, this multitasking is experienced as both quantitative and qualitative overload (Thinschmidt, 2010). The responsibilities of child care managers encompass even a broader range of work tasks, including personnel management, pedagogical leadership, administration, and public relations. This adds to the workload of pedagogical duties, as leadership positions in ECEC typically have limited time allocated to leadership-associates tasks (Nagel-Prinz & Paulus, 2012). According to official statistics from 2020, 7% of the 10,347 child care centers in NRW, and 8% in Germany, lack a contractually agreed allocation of time for leadership tasks (Bock-Famulla et al., 2021). Experts recommend a minimum of 20 weekly hours for the professional leadership and management, a criterion that is not met in 74% of child care centers in NRW (Bock-Famulla et al., 2021).

1.3.2 Work equipment and work station

Working in ECEC settings presents physical challenges for ECPs due to the nature of their responsibilities. These physical demands can be further exacerbated by the presence of poorly designed ergonomic furniture (Gratz et al., 2002). Inadequate ergonomic workplace design can lead to unfavorable body postures and movements, such as lifting and carrying. This issue may be compounded using furniture that is not appropriately sized for adults or is altogether absent. Additionally, non-body-proportional design elements within spaces, such as inadequate work heights for tasks like eating, playing, preparing, cleaning, personal hygiene, and dressing children, can contribute to these challenges (Sinn-Behrendet et al., 2014). Research findings indicate

that a high portion of ECPs face ergonomic challenges in their work environment. Specifically, 83% of ECPs reported regularly sitting on child-size furniture, while 60% mentioned that they spend most of their time sitting on the floor. Family day care providers, although working in a home-based setting, also reported engaging in these activities, albeit to a lesser degree (Gratz et al., 2002). This is confirmed by other research that reported the absence of suitable adult work tools and furniture as well as insufficient material resources (Fuchs-Rechlin, 2007).

Additionally, the dual-purpose use of spaces, such as using a group room for both playing and dining, can result in the need to move heavy furniture and handle additional loads. Inadequate or the absence of transport aids and unloading mechanisms can compound this issue (Rudow, 2004, 2017). The shortage of designated spaces for small groups and for ECPs to use as areas for relaxation and recuperation has been identified as a deficiency (Fuchs-Rechlin, 2007), even though break rooms are legally mandated by workplace regulations (Arbeitsstättenverordnung - ArbStättV, 2004).

1.3.3 Work environment

Noise is a prevalent work environment stressor in ECEC (Rudow, 2017; Thinschmidt, 2009; Viernickel, Voss, et al., 2013). Remarkably, 91% of ECPs consider high noise levels as an integral part of their professional environment, with 66% perceiving it as burdensome (Losch, 2015). Another study found that 94% of ECPs reported noise as having a significant impact on their personal stress levels (Losch & Schulze, 2016). Measurements conducted in child care centers have recorded sound pressure levels exceeding 90 decibel (A) (Nsabimana & Rennies-Hochmuth, 2016), and even 100 decibel (A) (Schad, 2002). In many other professions, the use of hearing protection is mandated when exposed to noise levels of this magnitude (> 85 decibel (A)) (Hall & Leppelmeier, 2015). The World Health Organization (WHO) guidelines emphasize the adverse health effects of noise and recommend sound pressure levels ranging from 35 to 55 decibel (A) for preschools (Berglund et al., 1999). However, achieving these levels may be impractical. Alongside the detrimental effects of noise exposure, ECPs face other unfavorable environmental conditions, including suboptimal temperatures, inadequate lighting, poor air quality (elevated CO2 concentration), PCB-contaminated materials (Polychlorinated Biphenyls), unpleasant odors, and limited room sizes (Rudow, 2017; Schad, 2002).

A systematic review has documented an epidemiologically increased risk of infection among ECPs, constituting an occupational hazard (Eisner et al., 2009). These infections primarily include common childhood illnesses like chickenpox, measles, mumps, rubella (all of which are considered airborne and/or droplet infections), as well as tuberculosis, flu, and colds (Rudow, 2017). This aligns with the subjective experiences of ECPs, who often report frequent occurrences of infectious diseases in their facilities, frequently introduced by children attending ECEC despite having symptoms such as colds, runny noses, and gastrointestinal issues. ECPs believe that this practice may elevate the risk of transmission to other children and staff, resulting in increased absenteeism and disruptions (Thinschmidt, 2010).

The social dynamics within the ECEC setting introduce a complex environment with distinct stressors. ECPs navigate multiple relationships, including children in their care, parents, colleagues, child care managers, service providers, and others. Working closely with children demands a high level of attention and vigilance, as ECPs are continually exposed to unpredictable stimuli (Curbow et al., 2000). This dynamic gives rise to various demands, including the management of children of different ages (Black et al., 2017), those with behavioral issues (Friedman-Krauss et al., 2014), psychiatric disorders, special needs (Rudow, 2017; Sinzig & Schmidt, 2007), language difficulties, cultural diversity (Haderlein, 2017; Kratzmann et al., 2013; Kratzmann & Schneider, 2009), and challenges from dysfunctional families (Rudow, 2017). ECPs often engage in emotional labor, which entails managing their own emotions and displaying appropriate emotions in response to both children's and parents' emotions (Da Jeung et al., 2018). This includes not only expressing socially desired emotions externally but also regulating internal emotional responses, which can be demanding (Grandey, 2000).

Parents also impose diverse demands on ECPs, with 60% of surveyed ECPs reporting very high parental expectations (Jungbauer & Ehlen, 2015). A qualitative study involving ECP focus groups identified interactions with parents as a primary source of workplace stress (Faulkner et al., 2016). Researchers found that dealing with parents can be more taxing and stressful than caring for children, particularly due to frequent conflicts, demanding requests, and the delegation of educational tasks (Jungbauer & Ehlen, 2015). This interaction often involves parents seeking individualized treatment and adaptations, with significant parenting responsibilities being shifted to the ECEC system (Hitzenberger & Schuett, 2017). With increasing ECEC attendance (cf. chapter 1.2), these demands have been found to be growing recently (Klusemann et al., 2020). Moreover, in a representative survey of 2500 child care centers, 22%

noted a trend toward increased aggression from parents toward ECPs (Haderlein, 2017).

These social demands are compounded by ECPs' perception of a lack of support from child care providers or employers ("Träger"). Even during staff shortages and unfilled positions, ECPs often feel compelled to maintain group operations, driven by a sense of responsibility toward parents and a lack of support from providers to implement temporary closures or reduced operating hours (Klusemann et al., 2020).

Child care managers have criticized inadequate communication and cooperation with providers, characterized by unclear and non-transparent information channels (Nagel-Prinz & Paulus, 2012).

While teamwork and team support are critical resources in the ECEC setting (Bloechliger & Bauer, 2016; Nislin et al., 2016) and are generally satisfying (Haderlein, 2015), some studies have identified negative communication patterns within teams as a source of stress (Bokor et al., 2017).

Lastly, ECPs frequently encounter a lack of societal appreciation for their work (Hitzenberger & Schuett, 2017; Viernickel, Voss, et al., 2013), which contributes to a discrepancy between their self-image and external perception (Rudow, 2017). Many ECPs face the societal stereotype that their job primarily involves play and recreation with children (Rudow, 2017); and they desire greater recognition in society (Fuchs-Rechlin, 2007). Effort-reward imbalance, characterized by an imbalance between invested efforts and perceived rewards, is a recurring theme in the literature (Backhaus et al., 2018b; Corr et al., 2015; Koch et al., 2017; Koch et al., 2015; Qi et al., 2014; Viernickel et al., 2017). According to a study, only 1% of child care managers feel supported by politics, which shows the perception of limited political support (Haderlein, 2015).

1.3.4 Work organization

In a study involving three different samples of ECPs, it was found that three out of five negative aspects related to their profession could be attributed to various aspects of work organization. These aspects include time pressure, dealing with excessively large group sizes, and facing challenges related to inadequate time for the preparation and follow-up of pedagogical activities (Thinschmidt et al., 2008).

ECPs experience time pressure which arises from the variety and volume of work tasks (cf. 1.3.1 work tasks) (Kusma et al., 2012; Kusma et al., 2011). In fact, within one study, 68% of ECPs reported this as a common issue (Rudow, 2004). Large

group sizes are a direct result of staff shortages. This further has the potential to amplify other stressful aspects of work (e.g., noise and multitasking) (Darius et al., 2023; Schad, 2002). ECPs have expressed concerns regarding the rising number of children per group, which they feel is exceeding appropriate limits and is continuing to increase (Viernickel, Voss, et al., 2013). Large group sizes also negatively impact the ability to provide individualized attention to children, particularly those with behavioral and developmental difficulties, which is on the rise (Seibt et al., 2005; Thinschmidt, 2010). This may lead to additional demands, since one's own expectations cannot be fulfilled (Rudow, 2017). Furthermore, the duration and organization of working hours have been identified as stressors among ECPs, particularly given the relatively high prevalence of part-time employment (Bock-Famulla et al., 2022). Work scheduling is further complicated by short-notice arrangements that often do not consider personal life, such as family obligations. Due to the nature of their work with children, ECPs frequently experience work interruptions in their everyday work life (Viernickel & Weßels, 2020).

Additionally, ECPs reported limited time for crucial work-related tasks, including preparation and follow-up work, collaboration with colleagues and external stakeholders, opportunities for child-free work, and sufficient breaks (Viernickel, Nentwig-Gesemann, et al., 2013). Regarding the lack of time for preparation and follow-up work, such as planning and reflection on direct pedagogical activities, 47% of child care managers and 45% of ECPs identify this as a source of stress (Rudow, 2004). It is worth noting that 34% of ECPs regularly work overtime due to their inability to complete the assigned workload within the allocated time, and child care managers face an even higher frequency of overtime work, with 66% of them reporting the need to work beyond standard working hours (Viernickel, Voss, et al., 2013). Furthermore, there are insufficient breaks throughout the workday (Viernickel et al., 2014) limiting opportunities for relaxation and recovery experiences (Sonnentag et al., 2017).

1.3.5 Psychological, physiological, and behavioral strain outcomes

Understanding the sources of work-related stress is critical for investigating its health impact on employees. However, each employee’s unique set of psychological, physical, genetic, and social conditions leads to individual differences in perceptions and responses to stress (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, 2008). To cope with stress, employees may use various strategies, which are influenced by their enduring and immediate conditions. These individual responses determine the degree of strain experienced, which is also influenced by the duration and intensity of

the stress. According to its definition, strain refers to the immediate consequences of exposure to stress factors (Neuner, 2016). The longer and more intense the exposure to stress, the longer the recovery of short-term stress responses takes, and the more likely long-term stress responses will occur (Geurts & Sonnentag, 2006). Long-term or chronic stress can lead to enduring adverse effects on an individual's overall well-being. These effects may manifest as psychosomatic complaints, physical illnesses, deteriorating mental health, and the adoption of unhealthy coping mechanisms like smoking, excessive alcohol consumption, and drug abuse (Beehr, 2014). In this chapter, the strain outcomes experienced by ECPs will be presented, without delving into the various individual factors that influence the strength and direction of this strain (Roßbach et al., 2021). It is essential to recognize that stress can sometimes yield positive effects (c.f. Figure 1); however, for the context of this dissertation, the focus will solely be on the literature pertaining to the adverse effects of stress on ECPs.

In general, high work-related and psychosocial demands placed on ECPs have been associated with an increased vulnerability to stress experience and subsequent outcomes (Jungbauer & Ehlen, 2015), including burnout (Backhaus et al., 2018b; Darius et al., 2023; Koch et al., 2015; Noble & Macfarlane, 2005; Schaack et al., 2020) and stress-related disorders such as depression (Backhaus et al., 2018a; Jeon et al., 2018). In situations where ECPs perceive a mismatch between work demands, their ability to control these demands, and the available resources, they tend to report increased levels of stress. This heightened stress is often associated with the occurrence of depressive symptoms and more frequent conflicts in their interactions with children (Whitaker et al., 2015). Similarly, one study investigated the relationship between individual psychological states, specifically psychological stress, and working conditions (Corr et al., 2015). The authors observed that 42% of surveyed ECPs experienced psychological stress which was strongest predicted by an imbalance between their efforts and rewards. Similar associations could also be found in a longitudinal study conducted among a German ECP sample, indicating an effort-reward imbalance (ERI) to be a source of strain among ECPs (Backhaus et al., 2018b; Koch et al., 2017). Moreover, scholars found a significant positive association between an ERI and hair cortisol concentration, a potential biomarker of chronic work stress, within a sample of ECPs (Qi et al., 2014). The ERI-model posits that work stress can arise when employees expend high levels of effort but receive insufficient rewards, such as low remuneration, a lack of appreciation, or job insecurity. This stress can ultimately result in psychological and physical health issues (Siegrist et al., 2004). A German study revealed

that an ERI among ECPs increased the odds ratio for depression by a factor of 3.7 (Backhaus et al., 2018a). Additional findings from a stress monitoring carried out by the professional association for health care and welfare services ("Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege") indicate that the psychological well-being of ECPs is notably lower, by 8%, when compared to the reference values of the general working population in Germany (Berger et al., 2000). The international literature emphasizes that when compared to employees in other professions, ECPs (Whitaker et al., 2015) and generally, those in educational professions (Kyriacou, 2001) tend to experience lower levels of well-being and higher levels of stress. Another American study further revealed that ECPs exhibit clinically significant levels of depressive symptoms at a rate ranging from two to five times greater than that observed in the general United States population (Linnan et al., 2017). Additionally, ECPs frequently experience emotional strain, which is partially attributable to their work-related demands (Cumming, 2017). On a behavioral level, it has been shown, that variables related to well-being such as higher levels of stress and emotional exhaustion, predicted a higher likelihood of turnover intentions among ECPs. Additionally, the same study showed that ECPs who perceived better working conditions were less likely to have intentions to leave their job and felt more committed to their profession (Grant et al., 2019). In particular, the perception of supportive structures as factors within the social work environment has been found to predict leaving the current position as well as the profession as a whole (McMullen et al., 2020).

Furthermore, the psychological strain experienced by ECPs has been linked to musculoskeletal complaints (Koch et al., 2015) and other somatic symptoms (Backhaus et al., 2018b), which are attributed to an imbalance between effort and reward in their work. In general, ECPs report significantly higher rates of psychosomatic complaints than the general German population, exceeding the average by 27% (Berger et al., 2000). Within the same study, the most commonly reported symptoms include internal restlessness, fatigue, rumination, as well as neck and shoulder pain, along with lower back pain (Berger et al., 2000). Early research on this topic suggests that ECPs may be more prone to experiencing musculoskeletal symptoms compared to other occupational groups due to a combination of physical and psychosocial work characteristics (Grant et al., 1995; Gratz & Claffey, 1996). A longitudinal study conducted in Sweden found a significant association between psychological workload and the occurrence of neck and shoulder pain. In contrast, physical workload was not found to be linked to neck and shoulder pain after adjusting for baseline psychological workload

and symptoms across all models tested (Larsman et al., 2008). A recent American study showed that ECPs' physical health is worse in terms of pain and general health, yet similar to population norms in terms of physical functioning (Otten et al., 2019). Similarly, in another American study, female ECPs exhibited a higher prevalence of mental and physical health conditions, as well as fair or poor health status, along with a higher frequency of mentally and physically unhealthy days, when compared to a national sample of female workers with similar age, education, race/ethnicity, and marital status (Whitaker et al., 2013).

Nevertheless, it is important to note that in the United States, ECEC is predominantly delivered by private sector entities, whereas in Germany, it is mainly administered by public and non-profit organizations. Furthermore, variations exist in the regulatory frameworks and funding mechanisms for ECEC between these countries, which can potentially influence the work-related experiences of ECPs including factors such as wages and job security, and ultimately affect their overall well-being. Consequently, when discussing these aspects in a broader context, it may be more suitable to draw upon research conducted in Germany or other countries with ECEC systems that similar to German systems.

In chapter 1.3, sources of work-related stress and their potential long-term effects on well-being, as presented in international literature, were discussed. Additionally, potential variations in working conditions between different countries were considered. However, at the beginning of 2020, with the outbreak of COVID-19, all ECPs worldwide faced the same unprecedented challenge: maintaining ECEC services under the conditions of COVID-19.

1.4 Overview of COVID-19 regulations and developments in child care in North Rhine-Westphalia

On 30 January 2020, the WHO declared the outbreak of the COVID-19 pandemic as a public health emergency of international concern (World Health Organization, 2020a). The WHO further constituted the coronavirus (SARS-CoV-2) outbreak which causes COVID-19 to be a global pandemic on 11 March 2020 (World Health Organization, 2020b). Following this, the workforce experienced unparalleled challenges and several occupations were deemed essential workers on which societal functioning relies (The Lancet, 2020). Among others, this novel situation forced the essential workforce of education to react immediately and find solutions for the

upcoming weeks (Jalongo, 2021). Globally, the ECEC sector was shifted to the private sphere as an immediate crisis response, and ECEC was temporarily unavailable. This worldwide closure of ECEC is unique in the history of welfare states (Blum & Dobrotić, 2021). Following this initial closure, child care policies were developed, and policymakers attempted to balance the often-competing goals of public health and education. These government responses varied greatly in terms of continuity, pace, patterns, and scope across 28 European countries, particularly during the reopening phase (Blum & Dobrotić, 2021). This variation highlights the unique and unprecedented nature of the situation the workforce had to confront. In addition to these cross-country differences in responses, there were also variations in OHS management within Germany (Robert Koch Institut, 2020b). The following description pertains to the state of NRW from March 2020 to June 2021, where and when the studies were conducted. A summary of the chronological development of regulations in ECEC in NRW is provided in figure 2, starting from March 2020.

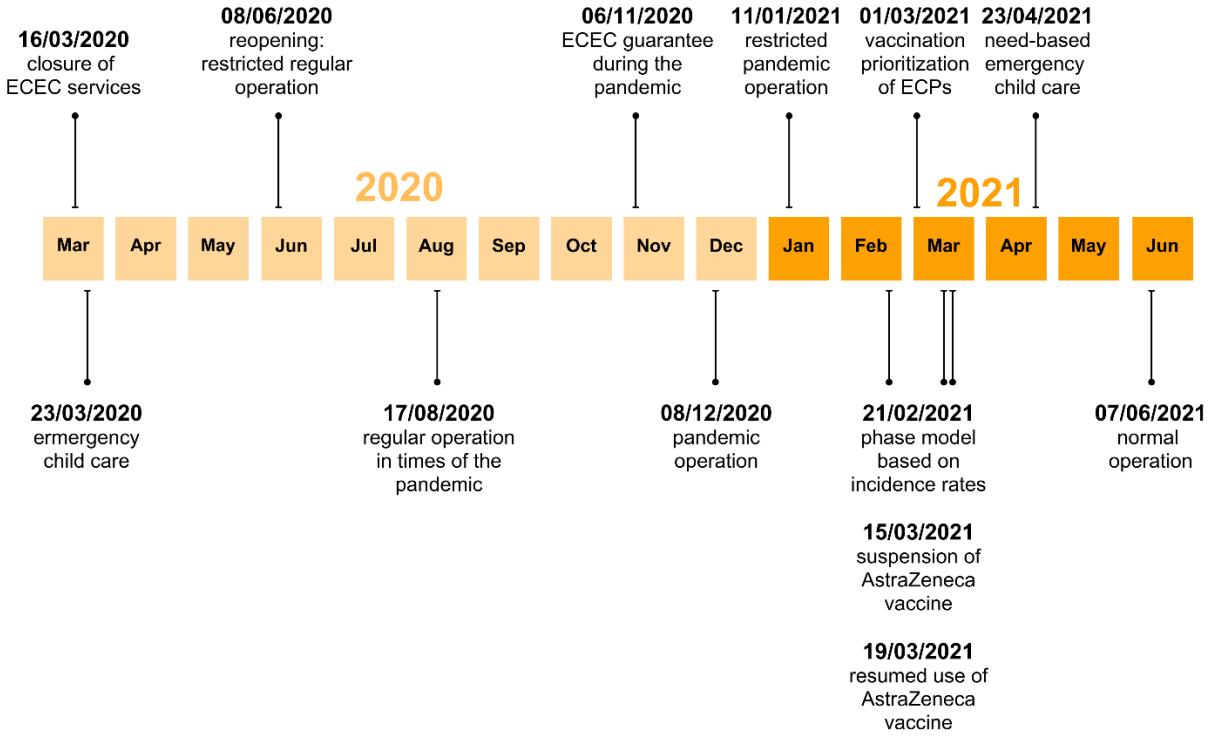

Fig. 2. Overview of regulations in ECEC in NRW during the COVID-19 pandemic from March 2020 to June 2021

As of March 16, 2020, ECEC services were completely closed. In order to ensure the operation of critical infrastructure, children of parents (respectively legal guardians) working as an essential worker were eligible for child care (MKFFI, 2020a).

This emergency child care (“Notbetreuung”) became effective from March 23, 2020 (MKFFI, 2020g).

As of June 8, 2020, the Ministry for Children, Families, Refugees, and Integration (MKFFI, “Ministerium für Kinder, Familie, Flüchtlinge und Integration”) decided to move forward with a reopening in terms of a restricted regular operation (“eingeschränkter Regelbetrieb”). From that point onward, all children, regardless of their parents' occupations, were able to attend ECEC programs (Landesregierung NRW, 2020b). However, this operation was primarily driven by public health-related measures, which frequently contradicted pre-pandemic work practices. Employers received instructions on how to redesign child care to comply with OHS guidelines. At this stage, only a few preventive measures are provided as examples. For instance, open educational concepts had to be transformed into fixed group settings with the same group of children and ECPs in clearly separated areas both indoors and outdoors. These group settings had no immediate interaction with one another. Parents were only allowed to enter the facilities in outdoor areas. Pick-ups and drop-offs were staggered to reduce congestion. In general, the weekly duration of child care was reduced by ten hours per child, allowing for additional time to implement comprehensive and enhanced cleaning and hygiene measures.

As of August 17, 2020, ECEC services returned to regular operation during the pandemic (“Pandemiebetrieb in Zeiten der Pandemie”) (Landesregierung NRW, 2020c). In response to declining COVID-19 cases, most of the previously introduced OHS measures were no longer necessary. Full-scale child care services were guaranteed, and pedagogical concepts could return to pre-pandemic norms, rendering group settings obsolete. Instead, the focus shifted to disease management for symptomatic children and employees, as well as testing opportunities for ECPs. Consequently, ECPs were able to undergo SARS-CoV-2 testing free of charge every 14 days outside of working hours (MKFFI, 2020e). In an effort to alleviate the workload on ECPs, the MKFFI launched an initiative (“KiTa-Helfer-Initiative”) recruiting additional personnel to assist pedagogical staff with non-educational tasks, such as hygiene measures (Landesregierung NRW, 2020a). During the fall of 2020, the management of symptoms led to increased uncertainty, prompting the MKFFI to issue detailed recommendations for handling illness symptoms, aiming to minimize discussions with parents (MKFFI, 2020c).

Starting from November 6, 2020, the MKFFI emphasized its commitment to providing child care services throughout the pandemic, ensuring they would not be

closed again (MKFFI, 2020b). This would be accomplished by once again prioritizing preventive measures (MKFFI, 2020d). However, as Germany grappled with the second wave of the COVID-19 pandemic (Schilling et al., 2022), a return to pandemic operation ("Pandemiebetrieb") became inevitable, which occurred on December 8, 2020 (MKFFI, 2020f). During this phase, in addition to ongoing infection control measures, two issues emerged. Firstly, the MKFFI urged parents to care for their children in the home environment whenever possible, and the utilization of ECEC facilities should only be considered in cases of utmost necessity. Secondly, ECEC facilities were granted greater autonomy to make individual adjustments regarding their own organizational and personnel resources. Therefore, different adaptions were possible, including adjustments to the daily child care routine, opening hours, drop-offs and pick-ups, child care duration, reduction or suspension of other educational activities, and staff training, as well as individual symptom management (MKFFI, 2020f).

As of January 11, 2021, the restricted pandemic operation ("eingeschränkter Pandemiebetrieb") followed (MKFFI, 2021b). This phase was characterized by a renewed and more urgent appeal to parents by the MKFFI. Additionally, group settings and the reduction of child care duration were mandatorily reintroduced. Between January 7, 2021, and March 26, 2021, ECPs could undergo COVID-19 testing up to six times without cause. As of February 21, 2021, a phased model was established, based on the monitoring of incidence rates, defining gradual reopening stages (MKFFI, 2021d). These phases included: (1) restricted pandemic operation (i.e., group settings, reduction of child care duration, parental appeal), (2) restricted regular operation (i.e., group settings, reduction of child care duration), (3) locally restricted operation (i.e., group settings, if necessary, reduction of child care duration), and (4) regular operation. In case incidence rates increased, a return to the previous phase was implemented.

Starting from March 1, 2020, employees working in ECEC were prioritized as the second vaccination priority group and became eligible for vaccination from March 8, 2021 (MKFFI, 2021a). All eligible individuals over the age of 18 were offered the AstraZeneca vaccine, while persons aged 16 or 17 were offered the BioNTech vaccine. However, on March 15, 2021, the German health minister temporarily halted the use of the AstraZeneca vaccine as a precaution following advice from the Paul-Ehrlich-Institute (Paul-Ehrlich-Institut, 2021). On March 19, 2021, the permanent vaccination commission (STIKO, "Ständige Impfkommission") recommended resuming the use of the AstraZeneca vaccine for COVID-19 vaccination, as the benefits of vaccination outweigh the known risks (Robert Koch Institut, 2021b).

The restricted regular operation was initially scheduled to end on March 8, 2021, but it was extended to April 11, 2021, and later further extended. As of April 12, 2021, rapid antigen tests became available to all children and employees in ECEC. Children were tested at home by their parents, and the use of self-tests was voluntary (MKFFI, 2021c).

On April 23, 2021, the federal emergency brake ("Bundesnotbremse") was implemented nationwide. In NRW, need-based emergency child care ("bedarfsorientierte Notbetreuung") was established when the seven-day incidence was 165 or higher for three consecutive days. Below a seven-day incidence of 165, restricted regular operation was applied. The transition from need-based emergency child care to restricted regular operation occurred when the seven-day incidence was below 165 for five consecutive working days. There were clear guidelines regarding which children could attend the need-based emergency child care (MKFFI, 2021f). Due to the positive developments in incidence rates, and in view of the progress made in vaccination, ECEC returned to normal operation in NRW from June 7, 2021 (MKFFI, 2021e).

While the previous chapter outlined the progression of the COVID-19 pandemic with its various phases in ECEC, the next chapter will elucidate the developments at the workplace from an OHS perspective.

1.5 The impact of the COVID-19 outbreak on occupational health and safety

The COVID-19 outbreak has posed unparalleled difficulties for OHS (Godderis & Luyten, 2020). Public responses included the implementation of social distancing and lockdown measures. However, organizations also had to undergo occupational changes to ensure the safety and well-being of their employees (International Labour Organization, 2020). Prompt actions were taken to establish evidence-based guidelines prioritizing the implementation of occupational preventive and protective measures, underscoring their important role in mitigating the spread of infectious diseases in the workplace (Cirrincione et al., 2020). These measures included educating employees on the importance of staying home when sick, facilitating remote work arrangements, reducing business travel, and discouraging social gatherings (Kaushik & Guleria, 2020). Workplaces where applicable switched to remote work. While working from home increased flexibility in working conditions, it also resulted in a loss of social support at work. Furthermore, balancing work and family, often combined with caring

for children due to closed ECEC services and schools, increased the burdens on employees under pandemic conditions (Giorgi et al., 2020). This highlighted the pivotal role of ECPs in the lives of parents as they navigated their personal and professional responsibilities (Kalluri et al., 2021). Employees who could work from home experienced greater boundary management difficulties but were better positioned than those who could not work from home (Burdorf et al., 2020). Industries unable to transition to remote work models experienced more pronounced negative impacts, with certain sectors, such as health care and child care, being disproportionately affected, especially those with a higher representation of women (OECD, 2020). Personal care and service occupations, including the ECEC sector, were particularly categorized as vulnerable to exposure to infections and diseases, making them among the highest-risk occupations for COVID-19 transmission (Baker et al., 2020). As early as March 2020, scientific literature elucidated the potential for the COVID-19 pandemic to heighten occupational health risks for essential workers. This is largely due to the nature of their work, which often involves close physical contact with others and an increased likelihood of exposure to SARS-CoV-2 (Burdorf et al., 2020). Besides the objective risk of infection, these scholars anticipated psychological and psychosocial consequences that needed to be addressed. In particular, health care workers were likely to encounter issues such as insomnia, burnout, depressive symptoms, and post-traumatic stress disorder (Burdorf et al., 2020).

In April 2020, an initial review of the literature synthesized the potential impact of the COVID-19 outbreak on employees' mental health, specifically examining stress related to perceptions of safety, threat, risk of contagion, infobesity, and the unknown. Nonetheless, the scarcity of existing studies underscored the necessity for additional research, especially focusing on health care workers (Hamouche, 2020). Accordingly, an early research focus of OHS research predominated among occupational groups of health care workers. For example, a subsequent meta-analysis identified that the absence of practical support, such as organizational support, adequate training, and confidence in infection control, could increase the risk of psychological distress among health care workers. Workers who lacked such support were more vulnerable to psychological distress. Conversely, the study found that the provision of personal protective equipment (PPE), proper training, and clear communication could act as protective factors (Kisely et al., 2020). However, besides health care workers, there were numerous other occupational groups at a higher risk of contracting COVID-19 and suffering

from COVID-19-related mental health impacts, yet these groups remained underrepresented in international literature until then (Sim, 2020).

In May 2020, a large-scale German research project called "Corona-KiTa" was initiated as a collaboration between the German Youth Institute (DJI) and the Robert Koch Institute (RKI). The study aimed to investigate how the ECEC sector coped during the COVID-19 pandemic and the role that young children played in the spread of SARS-CoV-2 (Robert Koch Institut, 2020a). The initial monthly reports solely covered numerical data on ECEC operations, staffing situations, and incidence rates relating to different federal states (Robert Koch Institut & Deutsches Jugendinstitut, 2020a, 2020b, 2020c). In this context, the united union for social and educational professions ("ver.di für Sozial- und Erzieherberufe") raised concerns regarding these reports, noting the inadequate consideration of the perspective of ECPs (ver.di, 2020).

Following the initial months of ECEC closure, the implementation of preventive measures became imperative to mitigate the risk of COVID-19 infections and transmissions upon reopening (Calvo Gallardo et al., 2020). However, integrating preventive measures within the context of children presented unique challenges. Interestingly, early occupational research among a large employee sample conducted in June 2020 revealed that the number of adopted preventive measures was negatively associated with psychological distress (Sasaki et al., 2020). Considering the available evidence at the start of the research project "Arbeitsmedizinische KiTa-Studie" in June 2020, it becomes apparent that the occupation of ECPs posed high complexities for OHS practices during the COVID-19 pandemic, on top of the already existing critical work demands. Therefore, it also posed difficulties for ECPs' mental and physical health.

1.6 Aims of dissertation

The previous chapters provide an overview of the structural barriers, work demands, and the multitude of evolving pandemic regulations in ECEC. Thus, they highlight the persistent and ongoing challenges experienced by ECPs. Until June 2020, there was a lack of research investigating the impact of the COVID-19 pandemic on the work and health of ECPs. Accordingly, research was needed to explore the experiences of ECPs during the pandemic, including their perceptions of preventive measures, COVID-19-related demands, and work stress, as well as their mental and physical health. This dissertation sought to close this research gap.

This topic holds considerable public relevance due to the unique circumstances presented by the COVID-19 pandemic, which involved unprecedented closure and re-opening processes of ECEC facilities. Additionally, there is a recognized high societal and economic value associated with ECPs. They play a critical role in the development and education of young children, contributing to the overall well-being of future generations and supporting workforce participation through the provision of essential ECEC services. Given the projected substantial increase in the ECEC workforce in the coming years due to increasing ECEC demands, ensuring the health and well-being of these professionals in their occupation becomes imperative. This includes providing support to the workforce during crises such as the pandemic and drawing lessons from these experiences for long-term improvement.

The results of the research project "Arbeitsmedizinische KiTa-Studie" will be showcased through three original studies that have been published. Due to the novelty of the situation and a lack of evidence regarding working conditions in child care during the COVID-19 pandemic, the dissertation adopted a qualitative exploratory approach for the first study, accompanied by two quantitative studies. Figure 3 illustrates the different data collection periods of the research project. Table 3 summarizes the individual studies, including their aims and the evaluation method used. Ethical approval for conducting the studies was obtained from the Ethics Committee of the Medical Faculty of Heinrich Heine University of Düsseldorf (study number 2020-1067).

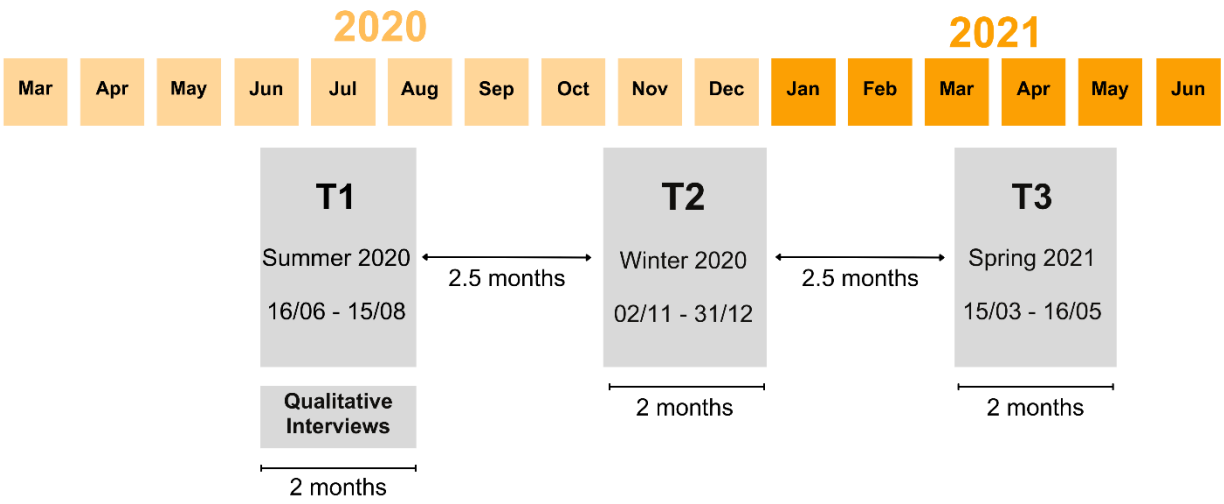

Fig. 3. Graphical representation of the three different measurement points within the "Arbeitsmedizinische KiTa-Studie"

Table 1. Overview of studies included in the dissertation

Study	Chapter	Research Aim	Evaluation	Reference
1	2	Exploratory qualitative design investigating the: • practical implementation of preventive measures by ECPs • perceptions and evaluations of implemented measures • changes in working conditions as a result of the implemented measures • impact of the measures on the well-being of ECPs	Content analysis using MAXQDA Software (VERBI Software. Consult., 1989 – 2023)	(Gritzka et al., 2022)
2	3	Quantitatively assessing the: • prevalence of work-related work stress (i.e., effort-reward imbalance) and overcommitment during the COVID-19 pandemic • prevalence of somatic symptoms (PHQ-15) among ECPs during the COVID-19 pandemic • association between psychosocial work stress (ERI, overcommitment) and somatic symptoms (PHQ-15)	Multiple logistic regression using SPSS	(Gritzka, Angerer, Erschens, & Diebig, 2023)
3	4	Quantitatively assessing the: • association between fear of COVID-19 and subjective well-being (WHO-5) • relationship between COVID-19-related work stressors (i.e., perceived risk of infection and poor employer support) and fear of COVID-19 • mediating role of fear of COVID-19 in the relationship between COVID-19-related work stressors and subjective well-being (WHO-5)	Mediation analysis and the estimation of indirect effects using SPSS with the Hayes PROCESS Macro (Hayes, 2018)	(Gritzka, Angerer, & Diebig, 2023)

2 **Gritzka, S., Angerer, P., Pietrowsky, R., & Diebig, M. (2022). The Impact of the Implementation of Preventive Measures Due to COVID-19 on Work Design and Early Childhood Professionals' Well-Being-A Qualitative Study.** ***International Journal of Environmental Research and Public Health*****, *19*(3). https://doi.org/10.3390/ijerph19031739**

3 **Gritzka, S., Angerer, P., Erschens, R., & Diebig, M. (2023). Der Zusammenhang von gesundheitskritischen Arbeitsbelastungen und somatischen Symptomen bei frühpädagogischen Fachkräften in der Kindertagesbetreuung während der COVID-19-Pandemie [The Relationship of Work Stress and Somatic Symptoms Among Early Childhood Professionals During the COVID-19 Pandemic]. *Psychotherapie, Psychosomatik, medizinische Psychologie.* Advance online publication. https://doi.org/10.1055/a-2055-1738**

4 **Gritzka, S., Angerer, P., & Diebig, M. (2024). The Mediating Role of Fear of COVID-19 in the Association between COVID-19-Related Work Stressors and Subjective Well-being: Path Analysis by Cross-sectional Evidence in the Child Care Sector across Three Samples. Journal of occupational and environmental medicine, 66(1), 78–91. https://doi.org/10.1097/JOM.0000000000002997**

5 Discussion

The COVID-19 pandemic has underscored the essential role of ECPs in the field of ECEC, highlighting its importance as vital infrastructure for community and economic development (Yamoah et al., 2023). However, newfound recognition came at a cost to ECPs, who had to deal with pre-existing structural challenges, demanding working conditions, and profound adaptions during the pandemic. Despite the transition of the pandemic into an endemic phase in the latter half of 2021, driven by the immunization of approximately 70% of the global population (Ioannidis, 2022), it was not until May 2023 that the WHO officially declared the end of the pandemic (World Health Organization, 2023a). Nevertheless, scholars caution against the lack of systematic analysis of the pandemic and its associated measures to extract sufficient insights and lessons. Failure to do so leaves the world dangerously unprepared for future pandemic threats or similar crises (Clark et al., 2022). This dissertation aims to contribute to pandemic preparedness efforts by conducting comprehensive research among German child care facilities at three different measurement points. Pandemic preparedness represents the capacity of institutions, such as health systems and public health authorities, to successfully anticipate, detect, respond to, and mitigate disease outbreaks with the goal of alleviating the health, societal, and economic consequences of outbreaks (Oppenheim et al., 2019). While pandemic preparedness is intricate, it is typically assessed through the lenses of surveillance, response, and health care capacity (Sands et al., 2016). This dissertation focuses on pandemic preparedness through the lens of OHS by examining the impact of the pandemic on the working conditions and health of ECPs as essential workers. When interpreting the results, it is crucial to consider that there is no single COVID-19 pandemic. Instead, the following discussion draws on research from various phases, each with distinct regulations, infection rates, and pandemic management approaches, conducted in different countries.

In the subsequent sections of the discussion, chapter 5.1 systematically presents and interprets the qualitative findings, followed by the discussion of the quantitative findings in chapter 5.2. The next chapter 5.3 reflects on the strengths and limitations of this dissertation project. Finally, chapter 5.4 highlights the implications regarding future research and practice.

5.1 Summary of qualitative findings in published literature context

5.1.1 Implementing preventive measures in child care

A qualitative study explored the implementation of COVID-19 preventive measures in ECEC settings, as well as the perception of these measures and their impact on working conditions and well-being. Qualitative interviews were conducted with 27 child care managers (mean age = 48 years ± 10.76; range = 30-63 years; 93% female). The interviewees exhibited a high degree of diversity in terms of leadership experience, employment in their respective child care centers, and the size of the centers (i.e., the number of children and ECPs). This diversity allowed for a comprehensive understanding of the reopening process and the implementation of preventive measures. The protective effect against the spread of COVID-19 infections through preventive measures in ECEC centers has been demonstrated (Neuberger et al., 2022). However, qualitative research conducted within this dissertation project uncovered the negative impact of these measures on the work and well-being of ECPs during the period between June and August 2020, which marked the reopening after lockdown. At this point, only selected results are presented and discussed, given the wealth of insights derived from the interviews.

Implementing predefined governmental OHS measures presented challenges, including fixed staff compositions that resulted in staff shortages and inflexibility. The more stringent handling of symptomatic management was demanding, particularly when engaging in discussions with parents. Intensified hygiene practices and the reorganization of indoor and outdoor areas to comply with OHS measures also imposed physical demands. These findings were largely consistent with another qualitative study conducted with child care managers by the DJI and RKI (Robert Koch Institut, 2021a). In contrast to Gritzka et al. (2022), the RKI and DJI study is primarily focused on describing the measures and provides fewer insights into how these measures may have affected the work and well-being of ECPs.

While the implementation of measures was found to be feasible according to child care managers, it was only manageable through the high level of commitment displayed by ECPs and the availability of resources (e.g., adequate staffing, perceiving the implementation of measures as a team effort, personal resilience, and parental cooperation). Research generally indicates that ECPs often demonstrate overcommitment in their work (Backhaus et al., 2018b). Most of the literature on the reopening of

educational institutions following the COVID-19 lockdown has focused on strategies for reopening primary and secondary schools (Lordan et al., 2020; Sheikh et al., 2020; Viner et al., 2021). Only a few studies have investigated the feasibility of implementing preventive measures and adherence to them. Consistent with our findings, these studies have also highlighted the critical role of staff commitment and communication among stakeholders. They have also described barriers to rapid implementation, such as challenges related to physical environments, parental adherence, inadequate guidance, and the need to balance preventive measures with educational goals (Amin-Chowdhury et al., 2022; Sundaram et al., 2021). A systematic review examined the preventive measures taken in schools in the WHO European Region and highlighted their potential impact on children's health and safety but overlooked the effects on educational staff (Lo Moro et al., 2020). In this qualitative study, child care managers emphasized the necessity of adapting certain measures to the needs of young children. It can be assumed that implementing infection control measures may be more challenging in child care settings with infants, requiring additional efforts to adhere to these measures (Green et al., 2021). This placed a particular burden on ECPs who had to constantly balance infection control measures with meeting the needs of the children. Research showed that workers who were unable to work remotely, such as ECPs, and whose infection control needs were not met exhibited the highest prevalence of anxiety and depressive symptoms among all workers during the COVID-19 pandemic (Smith et al., 2021).

The qualitative interviews provided additional insights into the perception and evaluation of the implemented measures. Child care managers assessed these measures as stress-inducing and challenging, categorizing them as work stressors that contributed to perceived stress. Research indicates that this appraisal represents an underlying mechanism crucial for employees to effectively adapt to their work environments (Gomes et al., 2013). Furthermore, these measures were described as lacking clarity (i.e., offering excessive decision latitude), exhibiting ambiguity, and providing information that was perceived as medical and overwhelming. The reasonableness of the measures was complicated by the fact that their implementation significantly altered the entire process of child care and the occupational role of ECPs. While the measures may have made sense from an infection prevention perspective, they raised practical questions. This aspect of reasonableness was further complicated by the contrast between the more relaxed measures in the public sphere and the stricter measures in ECEC. Other studies have shown that individuals with greater knowledge,

trust in political decisions, and a less pessimistic perception of the COVID-19 situation are more likely to embrace preventive measures (Shen et al., 2021). Consequently, the critical perspectives held by child care managers may have presented challenges to the effective implementation of preventive measures and could have hindered adaptation to other workplace changes.

5.1.2 Working conditions and well-being during the reopening-phase

The changes resulting from the implemented measures were mapped onto work characteristics related to (1) work organization, (2) work tasks and content, and (3) the social work environment.

Firstly, these measures resulted in an overall increase in workload, a trend observed in studies among ECPs in various regions, including North America (Crawford et al., 2021), Australia (Berger et al., 2022) as well as Germany, Finland and Israel (Heikkinen et al., 2023). Furthermore, Gritzka et al. (2022) suggested that these measures may have amplified existing work stressors (c.f. chapter 1.3.1 and 1.3.4). Noise levels, for instance, intensified due to children being grouped in a single room. Overtime became necessary to promptly implement these short-term changes. Interruptions occurred when ECPs were mentally and physically diverted from their tasks during child drop-offs and pick-ups. Multitasking became the norm as ECPs had to adhere to enhanced hygiene measures during various caregiving and educational activities.

Secondly, in terms of work content, the nature of tasks shifted towards being more directive and less focused on child development and child-friendliness. A German study reported a significant reduction in the quality of care, as noted by child care managers, due to COVID-19 measures (Grgic et al., 2022). Pedagogical activities could no longer be carried out as usual due to preventive measures like fixed group settings. Additionally, greater attention was required for anxious children or those kept at home by their parents, necessitating remote engagement by ECPs. These findings align with another study where ECPs expressed a feeling of performing an entirely different job or multiple job roles simultaneously (Quinn et al., 2022). A longitudinal study further demonstrated that ECPs engaged in fewer pedagogical tasks, particularly when child care managers faced difficulties in implementing these measure (Diefenbacher et al., 2022). Research conducted before the pandemic indicated that ECPs often experienced stress from tasks unrelated to pedagogy and from making concessions in their caregiving approaches (Hall-Kenyon et al., 2014). Therefore, additional

"illegitimate" tasks resulting from preventive measures challenged an ECP's professional identity and may have diminished their sense of purpose in their work (Semmer et al., 2015).

Thirdly, changes were observed in the social work environment. Interactions among staff, leadership, and teams were perceived as complex, hindering effective teamwork. Communication with parents shifted predominantly to digital media, with minimal in-person communication centered around discussions about measures. ECPs reported enduring damage to their relationships with parents, a finding corroborated by a recent longitudinal study. Scholars have suggested that staff-parent interactions deteriorated due to the implementation of preventive measures during the COVID-19 pandemic, including restricted non-verbal communication and reduced daily conversations. In contrast, staff-child interactions showed relatively moderate changes in the same study (Neuberger et al., 2023). This study also provided evidence that parents who refused to accept COVID-19 measures, such as bringing children with colds to ECEC centers, significantly contributed to poorer staff-parent interactions, a phenomenon also noted in Gritzka et al. (2022).

The qualitative interviews revealed that the measures in place and the heightened stress resulting from changed working conditions had adverse consequences for the well-being of ECPs. This aligns with quantitative studies indicating that the pandemic increased perceived stress levels (Bigras et al., 2021; Quinn et al., 2022) and decreased the well-being among ECPs (Bigras et al., 2021). Additionally, one study found that one-third of ECPs and child care managers experienced moderate-to-high post-traumatic distress and symptoms of post-traumatic stress disorder during the COVID-19 pandemic (Berger et al., 2022). In Gritzka et al. (2022), child care managers reported feelings of emotional and psychological exhaustion. Interestingly, pre-pandemic research indicated that team support, a clearly defined job role, and confidence in job performance served as protective factors against emotional exhaustion and burnout in ECPs (Løvgren, 2016). However, within the context of the implemented measures, these three factors were limited. Child care managers reported feeling underappreciated by both parents and society, leading to frustration and anger. This underappreciation among ECPs displays a recurring theme in literature before the COVID-19 pandemic (Hitzenberger & Schuett, 2017; Nagel-Prinz & Paulus, 2012). Given the increased workload and unique circumstances, the desire for greater recognition likely intensified. Frustration was evident as child care managers often compared themselves to teachers and medical professionals, whom they perceived as receiving

more recognition from the media and society. Furthermore, the lack of interaction with the entire child care community, including staff, children, and parents, diminished their sense of belonging to a broader social collective. This is important as research showed that a sense of belonging in the workplace positively correlates with mental well-being during the COVID-19 pandemic (Capone et al., 2022). In line with other research among Australian ECPs, child care managers perceived a high risk of infection in their work environment due to close proximity with children and expressed fear of COVID-19 (Berger et al., 2022). A review comprising data from 91 studies documented that fear of COVID-19 was associated with depressive and anxiety symptoms, stress, and low mental well-being (Alimoradi et al., 2022). Lastly, concerns about the future, especially regarding the introduction of new measures, were prevalent. This underscores the burden associated with the implemented measures.

5.2 Summary of quantitative findings in published literature context

5.2.1 Work stress and somatic health during the COVID-19 pandemic

The study conducted by Gritzka et al. (2023a) examined the relationship between work-related stress (i.e., operationalized as an Effort-Reward Imbalance; ERI) and somatic symptoms during the COVID-19 pandemic. Additionally, prevalence rates for an ERI, moderate to high symptom severity, and overcommitment were assessed. A total of 1009 ECPs, predominantly female (92.3%), with an average age of 42.83 years (SD = ± 12.42; range = 18–70), participated in the study. It was assumed that new COVID-19-related work stressors coupled with a lack of perceived reward for heightened workload, may increase the experience of an ERI and somatic symptoms among ECPs. The results indicate that 72.3% of the sample experienced an ERI, and 25% of ECPs exhibited a high level of overcommitment. Contrary to expectations, the experience of ERI falls in line with the figures described prior to the COVID-19 pandemic: German studies reported prevalence rates for an ERI between 65% (Koch et al., 2017) and 89.3% (Backhaus et al., 2018b). Contrary to the descriptions in the qualitative study conducted by Gritzka et al. (2022) and other studies that reported higher stress levels (Bigras et al., 2021; Quinn et al., 2022), this study did not find increased work stress in terms of an ERI. Yet, the number still exceeds the comparison value of various professional groups in multicohort studies (31.7%) (Dragano et al., 2017), signifying that ECPs encounter a higher-than-average level of work stress.

Other studies found that the ERI among paramedical and medical professionals increased during the pandemic (Delamarre et al., 2022). While there is an established cut-off value for an ERI, a cut-off value does not exist for overcommitment. Different calculation methods based on quantiles have been employed in the literature to define high overcommitment, making it difficult to compare. However, during the qualitative study, child care managers consistently emphasized the high levels of overcommitment displayed by ECPs. The results in Gritzka et al. (2023a) suggest that the stressful period and the balancing act between ECEC responsibilities and OHS concerns did not increase the levels of overcommitment, as it is a personality trait. Instead, it may have brought the existing high overcommitment among ECPs to light. Based on the mean value of overcommitment (M = 15.1), the sample of ECPs demonstrated higher overcommitment compared to other professional groups (Nuebling et al., 2013). However, within their own professional cohort, this high level appears to be consistent with prior research (Backhaus et al., 2018b; Darius et al., 2022).

Nevertheless, investigating the change of ECPs' work-related stress and somatic symptoms from a pre-pandemic to a pandemic state is challenging due to the absence of longitudinal data within the literature. No longitudinal studies are available to enable the comparison of the situation before, during, and after the outbreak of COVID-19. Therefore, only results from different studies with various samples can be compared with each other. In Gritzka et al. (2023a), the four-week prevalence of somatic symptoms with moderate to high severity was 45.2%. This result corroborates the finding of Backhaus et al. (2018b) who reported a seven-day prevalence rate of 47.3% for somatic symptoms in ECPs. However, the timeframe, but more importantly the different measurement instruments need to be considered in this context. The Patient Health Questionnaire (PHQ-15; Kocalevent, 2013) categorizes somatic symptom severity into 'minimal', 'mild', 'moderate', and 'severe' levels. In contrast, the questionnaire used by Backhaus et al. (2018b) (i.e., 10-item somatic symptoms scale from the Burnout Screening Scales; Hagemann, W., & Geuenich, K., 2014) only captures the presence of somatic symptoms. It does not assess the severity of symptoms. Therefore, when interpreting the data, it is important to note that 45.2% represents the prevalence rate for moderate-to-severe symptom severity compared to 47.3% as the prevalence rate for the presence of somatic symptoms. Examining studies that utilized the PHQ-15 within the broader German population, four-week prevalence rates ranged from 9.3% to 14.9% before the onset of the COVID-19 pandemic, for women 10.3% to 19.9% respectively (Hinz et al., 2017; Kocalevent, 2013). During the COVID-19

pandemic, a four-week prevalence between 7.6% and 15.3% was observed (Deimel et al., 2022). Therefore, the prevalence found in the study by Gritzka et al. (2023a) is to be considered exceptionally high.

Work-related stress significantly increased the odds of experiencing moderate to high somatic severity by a factor of 4.1 (Gritzka et al. 2023a). This finding aligns with previous research that explored the association between work stress in terms of ERI and musculoskeletal complaints in ECPs (odds ratio = 4.0) (Koch et al., 2017), as well as associations between work stress and psychosomatic complaints (odds ratio = 4.4) in a large sample of employees (Jonge et al., 2000). The relationship was not moderated by overcommitment. However, it was observed in the study by Gritzka et al. (2023a), that overcommitment increased the odds of experiencing moderate to high somatic severity by a factor of 5.2. This implies that, amid the COVID-19 pandemic, possessing a high level of overcommitment had a more adverse effect on somatic health compared to work-related stress. It indicates that, even though the degree of overcommitment may have remained consistent as a personality trait, it had a strong impact on somatic symptoms when considering the odds ratios range mentioned in a review (odds ratio = 1.9 – 5.9) (van Vegchel et al., 2005). This could be due to the lack of established coping strategies, like team support, during the COVID-19 pandemic. There is a limited body of research that has examined employees' overcommitment during the pandemic, in particular its association with somatic health. One study suggests that during the COVID-19 pandemic, overcommitment may be a stronger predictor of poorer mental health outcomes than ERI (Shkembi et al., 2023). It is important to note, however, that the sample size in the study by Shkembi et al. (2023) was relatively small, with N = 68 participants. Other COVID-19 research showed that employees exhibiting high overcommitment are at increased risk of mental distress (Casjens et al., 2022). The same study highlighted the role of poor employer instructions and occupational infection risk on mental distress, which are also prevalent COVID-19-related stressors within the ECEC work environment.

5.2.2 COVID-19-related stressors and psychological well-being

While study 2 investigated the experience of work stress and its impact on physical health, study 3 focused on observing COVID-19-related working conditions and psychological well-being. Gritzka et al. (2023b) conceptualized the perceived risk of infection and poor employer support as COVID-19-related work stressors particularly present in ECEC settings. By developing an integrative research framework, it was

postulated that the fear of COVID-19 is rooted in COVID-19-related work stressors and is related to subjective well-being. It was further hypothesized that the fear of COVID-19 acts as a mediator between COVID-19-related work stressors and subjective well-being. This mediation hypothesis was supported in two out of three samples, as Gritzka et al. (2023b) utilized three cross-sectional samples of ECPs to validate the established research framework (N_{T1} = 423, N_{T2} = 142, N_{T3} = 584). In accordance with the qualitative findings in Gritzka et al. (2022), findings demonstrated that ECPs perceive a high risk of infection within their workplace (M_{T1} = 4.3, M_{T2} =4.3, M_{T3} = 4.4 on a five-point Likert scale). This perception aligns with research that statistically modeled the occupational infection risk of COVID-19 (Zhang, 2021). Among non-health care occupations, ECPs were identified as one of the occupations at the highest risk of contracting COVID-19. Factors such as disease exposure and close physical proximity to others accounted for nearly 48% of the variability in occupational risk prevalence (Zhang, 2021). Indeed, German ECPs accounted for 8.3% of reported COVID-19 cases within various occupational groups between January and October 2021. This placed ECPs second, following nurses who had the most reported COVID-19 cases accounting for 66.5%, while physicians ranked third with 4.5% (Nienhaus & Schneider, 2022). Other descriptive data obtained in Gritzka et al. (2023b) highlights the low subjective well-being of ECPs as measured by the WHO-5 (M_{T1} = 53.5, M_{T2} = 47.5, M_{T3} = 48.4). These scores are significantly lower than the average score of the general German population during the COVID-19 pandemic (M = 56.8) (Kuehner et al., 2020). However, a previous study conducted with German ECPs shortly before the pandemic reported a mean score of M = 49.8 (Backhaus et al., 2018a). This suggests that ECPs experienced very low subjective well-being both before and during the COVID-19 pandemic. It is worth noting that a high percentage of participants in these samples scored below the cut-off value of ≤ 50, indicating a positive screening for depression (Topp et al., 2015). Nonetheless, it is also essential to consider the gender composition of this profession, with 93% being women, as the prevalence of depressive disorders is known to be higher among women than men (Kuehner, 2003).

The majority of research has centered on factors contributing to the fear of COVID-19 within the personal environment, such as chronic illnesses or family infectivity (Cerda & García, 2022), and has been conducted among the general population (e.g., Malesza & Kaczmarek, 2021). Gritzka et al. (2023b) shed light on the role of work-related factors in shaping the fear of COVID-19 among ECPs. This finding offers a potential explanation for why COVID-19-related working conditions negatively impact

subjective well-being. In accordance with the stress(or)-strain framework (cf. chapter 1.3), it could be posited that the fear of COVID-19 represents a short-term consequence of strain, particularly when the perceived risk of infection and poor employer support are perceived as threatening, depending on individual factors (e.g., general health, coping strategies, resources). Fear has been described as a potential short-term strain consequence within the stress(or)-strain framework (Joiko et al., 2010). Considering the prolonged duration of the COVID-19 pandemic and the high intensity of stressors within the ECEC work environment, it is plausible that this short-term strain may have led to long-term consequences, particularly in terms of reduced subjective well-being. Other COVID-19 research, building upon the stressor-strain framework, has conceptualized the fear of infection and lack of support as stressors and found them to be associated with depression, anxiety, and strain among nurses (Lorente et al., 2021). Therefore, it remains challenging to definitively identify the role of the fear of infection, whether it acts primarily as a stressor or is itself a short-term strain outcome. In line with Gritzka et al. (2023b), several studies showed that the fear of COVID-19 acts as a mediator between risk perception and mental health outcomes such as depression, anxiety, and stress (Yıldırım et al., 2022) as well as between perceived health status and mental health (Ahorsu et al., 2020). All the aforementioned studies, including Gritzka et al. (2023b), share the limitation of cross-sectional designs, preventing to determine the causal ordering of fear of COVID-19. Among other, this limitation will be discussed in the next chapter.

5.3 Strengths and limitations

5.3.1 Study design

One major strength of this dissertation is the use of both qualitative and quantitative research methods to gain a comprehensive understanding of ECPs' work during the COVID-19 pandemic. This approach followed a convergent design, with qualitative interviews running concurrently with the quantitative surveys (Creswell, 2015). The status of the design as a true mixed-methods approach is uncertain due to the lack of clarity regarding whether the participants in the qualitative interviews also took part in the quantitative survey. The qualitative design was opted to pursue an exploratory approach (Kuckartz, 2014). This choice was particularly valuable in the context of applied health research, given the novelty of the research topic (Rendle et al., 2019; Stebbins, 2001). While the dissertation project involved multiple cross-sectional measurements

at different phases of the pandemic, it deviated from the originally planned longitudinal design. The initial study protocol was quickly developed to begin research activities when ECEC facilities in NRW reopened on June 8, 2020. This study was implemented right after another study conducted at the Institute of Virology at the Heinrich Heine University, which was investigating COVID-19 infections in ECEC facilities in the same city (Lübke et al., 2021). However, during the qualitative interviews, it was discovered that most facilities were declined from participating in the virological study due to limited testing capacities. This may have resulted in a low initial willingness to participate in this occupational medicine study. Additionally, the study's design, particularly its longitudinal aspect, could have been enhanced by selecting a predetermined number of participating ECEC facilities rather than initiating contact with all available facilities within the city. However, the choice to collaborate with the youth welfare office was made to improve the reputation and trustworthiness of this research project (cf. 5.3.2 Sampling and selection bias). Unfortunately, the initially planned longitudinal design could not be realized. Indeed, out of the total number of participating ECPs only 4.6% participated at both T1 and T2, 6.2% at both T1 and T3, 3.0% at both T2 and T3, and 1.7% at all three measurement time points. Therefore, the cross-sectional designs in study 2 and study 3 do not allow for the determination of causal relationships. As a result, the possibility of reverse or reciprocal causality between the constructs cannot be ruled out. It is important to acknowledge this limitation when interpreting the findings.

5.3.2 Sampling and selection bias

At the start of the research project in June 2020, there were 361 child centers and 174 family child care providers officially registered with the city, employing approximately 6,500 ECPs. Recruitment was supported by the youth welfare office. It distributed information about the project and survey invitations to all registered ECEC providers. These materials were then forwarded to child care centers, family child care providers, child care managers, and ECPs. Consequently, an exact response rate cannot be calculated, as it remains unclear how many ECPs were informed about the study and had access to the survey. Thus, response rates cannot be compared with existing literature data. Nevertheless, a total of 1,009 different individuals were reached across all measurement points, representing approximately 15% of the employed ECPs in the city. A notable strength of this research project lies in the extensive efforts undertaken to enhance ECPs' willingness to participate. For instance, the research

project was framed and branded as the “Arbeitsmedizinische KiTa-Studie” to make it more appealing and relevant to the target audience (Shropshire et al., 2009). Additionally, the study team emphasized the personal significance and practical approach with political stakeholders (i.e., MKFFI), accompanied by customized informational materials (van Quaquebeke et al., 2022). During the first data collection period, the reception of money lotteries was tested by using random selection through pseudonymized codes. However, out of 100 lotteries, only two winners responded, suggesting that this measure provided little to no benefit, as supported by the literature (Göritz & Luthe, 2013). In addition, online reminders, personalized postcards, and branded advent calendars were sent to the facilities. Interim results were reported in plain language. Contrary to expectations, the literature shows that sharing general study results may lower response rates (Göritz, 2010). It is recommended instead to incentivize participants by offering personalized feedback (Kühne & Kroh, 2018). However, providing such feedback can be challenging due to limited personnel and time resources.

This study was further limited by the absence of a non-responder analysis. Therefore, there is a potential non-response bias, indicating potential differences between respondents and non-respondents (Schupp & Wolf, 2015). Nevertheless, during the second data collection period in December 2020, phone contact with approximately 100 randomly selected ECEC facilities was made, reminding them about the survey and offering to resend the invitation link. Questions also inquired about potential reasons for non-participation. Several reasons were mentioned, including: (1) a feeling of low locus of control ("It won't make any difference anyway"), (2) not realizing that there were multiple survey time points ("But I already participated in summer"), (3) staffing shortages due to illness absences, (4) temporary closures of ECEC facilities due to COVID-19, (5) high workloads and limited time to complete the survey, (6) the survey being perceived as too long and time-consuming, and (7) an official ban on cell phones in the facilities, preventing online survey participation. Regarding points (1) and (2), the communication and promotion of the survey was further improved. As for points (3), (4), and (5), these issues were beyond the researcher’s control and were direct consequences of the COVID-19 pandemic or structural conditions in ECEC. However, we were able to address points (6) and (7). For T2, some survey instruments were already removed to reduce its length compared to T1. Regarding point (7), the data collection methods were altered, with a primary focus on using paper-pencil versions for the third measurement time point. Despite the efforts to ensure equal representation of each ECP in the city through random sampling methods in the quantitative approach,

(Etikan, 2017), the possibility of selection bias cannot be eliminated and presents a limitation (Winship & Mare, 1992). Thus, the outreach efforts through the youth welfare office may have mainly targeted child care providers willing to support this research project and acknowledge its significance. Furthermore, the distribution of study invitations may have been limited to child care managers who are either interested in the research topic or find it feasible for themselves or their staff to participate. Consequently, the same potential for self-selection bias may have occurred among the participating ECPs. In general, it can be assumed that the selection bias in qualitative research (cf. study 1) due to non-probability sampling is even higher (Robinson, 2014). The potential for self-selection bias cannot be ruled out in our qualitative interviews, as it is possible that only child care managers who were inclined to be interviewed or had a strong desire to express discontent with policy measures were included in the sample. Yet, our qualitative study achieved a broad range of opinions by conducting interviews with child care managers who varied in work experience, sociodemographic characteristics, and ECEC designs. The sample size of 27 was relatively large due to two main factors. Firstly, a diverse range of child care managers provided detailed and varied accounts until data saturation was achieved. Secondly, the study had broad exploratory objectives that required a comprehensive sample.

In terms of representativeness with regard to the quantitative studies, the demographic variables, specifically age and gender, of the samples conform to the German occupational population of ECPs (Deutsches Jugendinstitut, 2022). However, the proportion of child care managers (i.e., ECPs with a leadership position) appears to be significantly higher than reported in the overall population. Thus, in our survey, there are only two to three ECPs without managerial roles for each child care manager. This limitation also arises from the recruitment strategy, where child care managers may have participated in the survey but may not have forwarded it to their staff. Furthermore, the study was conducted only in one city in NRW, so rural regions or other federal states are not represented. The ECEC system in Germany operates under the principle of subsidiarity, resulting in a high degree of decentralization. Each of the 16 federal states establishes its own laws, regulations, and education plans based on general national guidelines. This results in high heterogeneity in ECEC conditions across the country (Schreyer & Krause, 2016).

5.3.3 Data collection and analysis

The qualitative interviews were conducted via telephone due to contact restrictions. While it is possible that in-person interviews could have yielded different content, it can be assumed that the content obtained through telephone interviews is equivalent (Sturges & Hanrahan, 2004). Qualitative research has its limitations, such as potential interviewer and coder influence, as well as socially desirable responses from interviewees (Helfferich, 2010). To mitigate bias, a semi-structured interview guide was developed, which was pilot-tested with experts from the youth welfare office beforehand. During a warm-up phase, interviewees were informed that there were no right or wrong answers, and only their opinions mattered. Furthermore, the transcripts were independently coded by two researchers, with a third researcher assisting in resolving any coding discrepancies. An iterative process was employed to minimize subjectivity in the interpretation of findings and ensure alignment with the interviewees' intended perspectives. It is worth noting that interviews were conducted until thematic saturation was achieved, indicating that additional interviews would not have yielded new categories (Saunders et al., 2018). However, one limitation in qualitative content analysis remains due to the risk of diminishing the meaningfulness of individual cases due to the reduction of content based on categories (Mayring, 2010).

In line with existing literature, there were no differences in the responses obtained from quantitative paper-based and online survey methods (Beuckelaer & Lievens, 2009). However, both survey methods exhibited missing values. After careful consideration and following guidance from the literature, multiple imputation was employed in study 3 to address these missing values. For most individual items, the 5% threshold was not exceeded, except for one item in the PHQ-5 ("pain or problems during sexual intercourse," 11.7%). However, the cumulative missing values would have exceeded 5% after building the overall scale score. Multiple imputation techniques have been demonstrated to be the superior method for handling missing values in complex datasets, particularly if the proportion of missing data is above 5% (Jakobsen et al., 2017). By employing multiple imputation, the aim was to maximize the number of usable cases, thereby enhancing the statistical power of the analyses and fully utilizing the informational richness within the data (Böwing-Schmalenbrock & Jurczok, 2012). Overall, it is questionable whether the two items "menstrual cramps or other problems with your periods" and "pain or problems during sexual intercourse" are appropriate in a non-clinical context, as the PHQ-15 is primarily designed for use in clinical settings and primary care (Kocalevent, 2013). In the paper versions, ECPs wrote

margin notes questioning the relevance of these items for the survey and refused to answer them. To account for potential biases, logistic regression analyses were conducted for all parameters, considering control variables. Adjustments were made for age, gender, and leadership position. It might have been advantageous to include other additional control variables (e.g., weekly working hours).

5.4 Implications

5.4.1 Implications for future research

The dissertation project provides an overview of German ECPs' working conditions, psychological, and physical health during the COVID-19 pandemic. Given that the pandemic has now reached an endemic state as of May 2023 (World Health Organization, 2023b), fewer direct recommendations for future pandemic research can be made.

In Gritzka et. al (2022), a qualitative approach obtained highly valuable insights of pandemic management in ECEC. Future studies could retrospectively gather best practices that have been most effective in managing the pandemic. Addressing these questions could be achieved through focus groups with ECPs as practical experts. The social context could help to generate ideas in a naturalistic setting regarding organizational or structural pandemic preparedness as well as adequate responses for future crises and pandemics (Ritchie et al., 2018). Additionally, it would be interesting to determine if preventive measures have been maintained in the long-term and if they have the capacity to facilitate ECPs' work even after the pandemic. For instance, during the qualitative interviews it was mentioned that the restriction of parents' entry into facilities had partially reduced discussions with parents and that children had become more independent. Yet, recent research indicates that outdoor pick-ups and drop-offs with parents remaining outdoors, had a significant negative impact on the quality of interaction between ECPs and parents in the long-term (Neuberger et al., 2023). It is also interesting to explore which trainable personal variables (e.g., hope, optimism, resilience, self-efficacy) and team-related variables (e.g., leadership effectiveness, communication) contribute to the successful implementation of preventive measures in the workplace during crises. Another avenue for future research should focus on exploring the resilience mechanisms and coping strategies employed by ECPs. Understanding the specific factors that contribute to their ability to adapt and thrive in challenging

circumstances can inform targeted behavioral interventions on an individual as well as team-level.

Future work should include a systematic review that systematically searches and synthesizes studies on ECPs' work and health during the pandemic. This is crucial due to the surge in publications during the COVID-19 pandemic (Riccaboni & Verginer, 2022). While Gritzka et al. (2023b) identified two specific pandemic-related work stressors, future research could investigate and quantify additional pandemic-related factors that affect the ECEC work environment and, consequently, the health of ECPs. Other research questions should aim to further elucidate the relationship between pandemic-related work stressors, the fear of infection, and well-being. It is also worth considering additional mediators or moderators, such as general health or resilience, within the integrated research framework. However, causal relationships can only be definitively determined through longitudinal data.

Another research question pertains to how much organizational autonomy and decision latitude is desired by employees in terms of preventive measures during a pandemic. According to the Job Demand-Control Model (Karasek, 1979) or the Job Demand-Control-Support Model (Johnson & Hall, 1988; Johnson et al., 1989), employees who have a high level of control (i.e., making own decisions related to work) experience less levels of stress as they have the ability to manage their work environment. Yet, the literature and most theoretical models refer this decision latitude to one's work tasks, rather to organizational decision latitude (Dhondt et al., 2014). However, more research is needed to distinguish the role of organizational decision latitude. Our results suggest a preference for reduced decision latitude regarding measures in ECEC, primarily due to the high uncertainty at that time.

Overall, it is necessary to conduct longitudinal studies in stress research within the ECEC sector, as such studies are scarce among this workforce.

5.4.2 Implication for pandemic occupational health and safety management in child care

Results within this dissertation help to identify areas for the improvement of pandemic preparedness. This chapter highlights key areas to advance pandemic OHS management in ECEC for future pandemics and crises. This comprises a holistic approach. By addressing these areas, ECEC can effectively respond to adverse events, not only after such crises, but also before, during, and after. Thereby organizational

resilience will be developed which better equips organizations to manage crises and ensure the well-being of ECPs (Duchek, 2019).

First, the development of guidelines for pandemic OHS management in ECEC should involve a participatory approach (Diebig et al., 2021). This means actively including ECPs, policymakers, parents, and relevant experts in the decision-making process. By incorporating diverse perspectives and expertise, guidelines can be comprehensive, contextually appropriate, and readily accepted by ECPs. This can enhance commitment and collective sense-making processes which ultimately predetermine the success of putting guidelines in action (May, 2013). It is important to address the concerns and doubts expressed by ECPs regarding the reasonableness and effectiveness of measures. When developing guidelines, all measures should be carefully considered from the perspective of OHS, assessing whether they may, for instance, alter working conditions and, if so, how this may impact health. Providing up-front information on pandemic management, fostering trust, and reducing negative appraisals can contribute to a more positive perception of preventive measures.

Secondly, following the development of participatory guidelines, it is essential to integrate comprehensive training and education programs for ECPs. Research shows that pandemic preparedness trainings can increase knowledge and behavioral intentions (Gershon et al., 2009). These trainings should focus on equipping ECPs with the necessary knowledge and skills to effectively implement preventive measures. These can be introduced in training programs for staff as well as incorporated as a fixed component of apprenticeships for new ECPs.

Thirdly, a key step is to strengthen collaboration and communication among stakeholders during times of crises. This includes fostering partnerships between ECEC centers, public health authorities, educational institutions, and relevant organizations. Establishing clear lines of communication and regular information sharing channels (e.g., one information channel) will facilitate the dissemination of critical updates. Thereby, ECPs will have first-hand access to accurate and timely information. This is of heightened relevance, as research demonstrated that consistent information and community-building buffered the well-being of employees during the COVID-19 pandemic (McKee et al., 2021). Furthermore, it is imperative to explore strategies for enhancing parent-staff collaboration and minimizing conflicts with parents during turbulent times.

Fourthly, external resources should be made available to support ECEC centers in their pandemic OHS management efforts. This includes financial support, access to

PPE, as well as personnel resources to encounter the additional workload (e.g., craftsmen for additional physical demands, and cleaning staff for hygiene measures). The perception of adequate employer support by providing resources will help to decrease the fear in the workplace and buffer ECPs' well-being. It is therefore advisable to reduce both crisis-related work stressors and their perception while simultaneously increasing rewards, whether in financial form or through recognition. Implementing strategies that promote recognition and appreciation for essential workers can contribute to lower stress levels (Quinn et al., 2022).

Lastly, interventions should also address the psychological well-being of ECPs to teach coping skills and resilience strategies to buffer negative strain outcomes, during a pandemic and under normal circumstances. High levels of resilience and hope had a significant predictive effect on subjective well-being and psychological health during the COVID-19 pandemic (Yıldırım & Arslan, 2020). Furthermore, in adverse times, organizations should consider evaluating their employees' levels of overcommitment to identify individuals who are even at a higher-risk of strain.

5.4.3 Recommendations for practice in the long-term

In a recently published position paper, 150 scientists caution against the collapse of the German ECEC system and urge policymakers to bolster the system's resources (Fröhlich-Gildhoff, 2022). To improve working conditions and ECPs' health in the long-term, it is vital to implement political measures. Scholars concluded that a more effective strategy for supporting a healthy and sustainable ECP workforce involves changes at the organizational level rather than individual interventions (Corr et al., 2015). Ensuring enough ECPs in the next decade requires establishing a training infrastructure with pathways that can deliver a high-quality training. In turn, this needs the necessary personnel, including teachers and practice mentors (Bock-Famulla et al., 2021). Furthermore, offering attractive training conditions, such as training contracts and competitive compensation may attract a greater number of career entrants. Additionally, strategies for retaining ECPs and mitigating turnover rates must be addressed. It should be considered to align ECP salaries with those of teachers, given the educational role fulfilled by ECPs. This adjustment could lead to a shift in the public perception of the ECP profession and its societal recognition. In the future, ECPs themselves should actively participate in defining what constitutes attractive working conditions for them. For instance, insights from the business sector, which deals with retention factors and employer branding in times of skilled labor shortages, could inform

these efforts. These actions will increase the staff-to-child ratio which is a key mechanism for alleviating work demands and mitigating the stress experienced by ECPs. Workplace risk assessments, particularly including psychosocial factors, should be thoroughly conducted in ECEC settings (Beck & Lenhardt, 2019). This method enables the systematic identification and proactive enhancement of critical psychosocial aspects of work. Nevertheless, interventions should be implemented on both an individual behavioral level as well as organizational level (Montano et al., 2014). In accordance with the stressor-strain framework, stress can be positively influenced through interventions by enhancing individual coping strategies, resources, and skills. This can result in reduced negative strain outcomes or even the absence thereof. A brief online training course (less than three hours) significantly increased ECPs' knowledge of stress reduction, the usage of prevention strategies, and re-appraisal emotional strategies (Lang et al., 2020). Given the limited time resources of ECPs, this low-dosage intervention might be especially promising. While this can be classified as cognitive-behavioral stress management, it is equally important to consider relaxation-promoting strategies, such as meditation, breathing, progressive muscle relaxation as well as mindfulness based interventions (Kaluza, 2012). A meta-analysis of randomized controlled trials summarized the improvement of anxiety, distress, depression and well-being after attending mindfulness trainings (Galante et al., 2021).

Moreover, psychological rewards, such as positive emotions related to their work, feelings of happiness, a sense of connection with children, recognition, and appreciation from others as well as self-efficacy experiences, are valuable resources for ECPs. Implementing measures to enhance these rewards can be instrumental in alleviating work-related stress, specifically addressing the issue of an imbalance between efforts and rewards (Lee et al., 2019). While such interventions lead to positive effects, the difficulty always remains in successfully implementing them in workplace settings. This is because those who need such measures the most often have the least time for them. Moreover, stress occurs while the employee is still at work. After work, however, ECPs’ strain levels may still be high (Ganster & Rosen, 2013). Therefore, it is important to train psychological detachment from work. Psychological detachment from work serves as a mediating factor in the relationship between work stressors and strain, as well as between strain and well-being (Sonnentag & Fritz, 2015). Thus, developing strategies and recovery experiences for ECPs to detach from work on a frequent basis may help them recover from work stress outside of working hours (Sonnentag et al., 2008).

In addition to individual resources, team-related resources can also be essential. A recent cluster-randomized controlled trial demonstrated that leadership training for child care managers facilitated the integration of a supportive team environment to managing high workloads. ECPs with the highest workloads benefitted the most in terms of enhanced well-being (Stein et al., 2021). Generally, team and leadership support are perceived as essential resources for ECPs (Bloechliger & Bauer, 2016). The quality of team has an impact on ECPs' stress regulation (Nislin et al.,2016), the higher the quality, the lower ECPs' cortisol morning level (Nislin et al., 2015). Interventions that address team collaboration, team development, and team communication are crucial for the well-being of ECPs to establish a sense of collegiality and community (Hur, 2015; McMullen et al., 2020).

6 Conclusion

This dissertation aimed to gain insights into the working conditions and health of ECPs during the COVID-19 pandemic, which is relevant considering several factors. The working conditions of ECPs were already highly challenging prior to the COVID-19 pandemic. Throughout the pandemic, ECPs were recognized as essential workers, playing a pivotal role in society. Nevertheless, the long-term prospects for this profession appear bleak due to inherent structural difficulties. The findings provide a deep understanding of ECPs' initial responses to preventive measures implemented during the early stages of the pandemic. Despite dedicated implementation, these measures negatively influenced the working conditions and well-being of ECPs. Although work-related stress levels remained relatively consistent with pre-pandemic levels, it also demonstrates a strong association with somatic symptoms among ECPs. Furthermore, the results suggest additional pandemic-related stressors, such as perceived risk of infection and inadequate employer support, contributing to poor mental health among ECPs, mediated through the fear of COVID-19. Prevalence rates of moderate to high somatic symptoms and poor subjective well-being among ECPs exceeded those of the general German population. The data collection ended in May 2021. It was not until two years later that the pandemic was officially declared over. It remains uncertain whether the situation has further deteriorated. This dissertation reinforces the importance of improving working conditions that affect the mental and physical health of ECPs, which has been further emphasized by the pandemic. Furthermore, the dissertation highlights opportunities to enhance pandemic preparedness in ECEC settings

and, consequently, improve the well-being of ECPs. Based on this dissertation, it is strongly recommended to increase efforts in structural improvements as well as work health promotion during crises and far beyond. This will be necessary to maintain ECEC services and prosperity in Germany within the next decade. However, it should not come at the expense of ECPs' health.

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Acknowledgments

First and foremost, I want to thank Prof. Dr. Peter Angerer for initiating the "Arbeitsmedizinische KiTa-Studie" and supporting my dissertation within this project. His guidance and supervision from the beginning have been invaluable in shaping the direction and progress of my research. I am also grateful to Prof. Dr. Reinhard Pietrowsky, who served as the second supervisor. I appreciate his prompt and efficient cooperation, which greatly facilitated the dissertation process. Special recognition goes to Dr. Mathias Diebig for his support during my time at the institute. I am thankful for his trust in my abilities and for providing me with the opportunity to prioritize my doctoral research. His valuable advice and support have been of immense help throughout my research journey. I would like to express my gratitude to the staff members at the institute. Their assistance has been crucial in ensuring the smooth operation of the studies and have greatly eased my work. I extend my appreciation to my fellow doctoral candidates for their moral support and scientific exchanges. To my family, I deeply appreciate their unwavering support, even though they may not be familiar with the academic world and research. Lastly, I want to thank Stefan for his encouragement, especially during the final stages of my dissertation. His motivation provided the necessary drive to overcome obstacles and complete this dissertation.