Mental Health and Psychosocial Relations in the Context of the COVID-19 Pandemic: Investigation of Maternal, Paternal, Young Children, and Student Populations

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Mental Health and Psychosocial Relations in the Context of the COVID-19 Pandemic: Investigation of Maternal, Paternal, Young Children, and Student Populations

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List of Abbreviations

ASQ-3 Ages and Stages Questionnaires. 89

CFI comparative fit index. 38, 39

CLPM cross-lagged panel model. xx, 34, 38, 39, 43–45, 80, 85, 96

ECTS European Credit Transfer and Accumulation System. 72, 75, 83

EPDS Edinburgh Postnatal Depression Scale. 6, 20, 22, 24, 27, 36, 39, 45, 48, 55–58, 61, 62, 80, 93

MLR maximum-likelihood estimation with robust estimators of model fit. 38

PBQ Postpartum Bonding Questionnaire. 21, 45

PBQ-16 Postpartum Bonding Questionnaire - short form. 21, 22, 25, 27, 36, 39, 55, 56, 58, 59, 61–63, 82

PFB-K Partnership Questionnaire - short form. 21, 22, 25, 27

PHQ-9 Patient Health Questionnaire (depressive syndromes). 71–75, 83, 84

PHQ-D Patient Health Questionnaire (German version). 70–73

PSS-10 Perceived Stress Scale. 21, 22, 25, 27, 38, 39, 55–58, 61, 62, 64, 70–73

RMSEA root-mean-square error of approximation. 38, 39

SEM structural equation modelling. 38

SRMR standardized root-mean-square residual. 38, 39

TLI Tucker-Lewis index. 38, 39

VIT Video Intervention Therapy. 87

WHO World Health Organization. 1, 7, 68, 89, 91

Abstract

The COVID-19 pandemic altered global daily life and routines fundamentally. Besides the physical threat of the virus, the pandemic and the measures and restrictions taken in its context, pose a potential threat to psychological health and can be considered a traumatic situation (e.g., Brooks et al., 2020; Kaubisch et al., 2022; Kowal et al., 2020; Krishnamoorthy et al., 2020; Wu et al., 2021; Xiong et al., 2020). Based on the perspective that different populations are affected by mental health problems, in this work, different populations that overlap some of the groups defined as at-risk during the pandemic (e.g., Kowal et al., 2020; Xiong et al., 2020) were investigated with regard to mental health and psychosocial relations in the pandemic period. Four different empirical studies are presented, targeting infant behavioral problems, the condition of parents of infants and toddlers, and the psychopathology of students. These also address some topics that so far seem to be rather underrepresented in the constantly growing publication of new findings. The first three studies belong to the CoviFam survey (focusing on families), the last one to the CoviStud survey (focusing on students). They were all assessed via online survey.

Study 1 cross-sectionally explored potential infant behavioral problems (crying, sleeping, and feeding/eating behavior) in the vulnerable first year of life and the associated maternal psychological burden during the COVID-19 pandemic, including the time of greatest restrictions, with $N = 577$ mothers from Germany and Austria. Further, maternal depressive symptoms and perceived stress were also investigated, as well as bonding and relationship satisfaction. It could be shown that 33.3% of mothers were at increased risk for a depressive episode, which is in line with findings from Ceulemans et al. (2021). Higher maternal perceived stress compared to before the pandemic adds to findings from Kowal et al. (2020). Regarding infant regulatory problems, for 21.7% of the infants, prolonged sleep onset latencies and/or increased night awakenings were reported, which Zreik et al. (2021), Perez et al. (2021) and Markovic et al. (2021) likewise indicated. Occurrence of excessive crying or eating and feeding problems in the study 1 sample was low. Altogether, this is partly in line with other findings (Buechel

et al., 2022; Perez et al., 2021; Reinelt et al., 2022). High burden due to infant crying or sleeping behavior, was reported by 28.7% and 19.3% (8.9% due to feeding and eating behavior) of mothers, respectively. An association was found between reported burden due to infant crying and sleep behavior and increased perceived stress, but not for depressive symptoms. In relation to positive relationship characteristics – bonding quality and relationship satisfaction – mothers indicated less burden. Additionally, higher levels of burden due to infant behavior were reported by those mothers, who had to care for more than one child, if they perceived a lack of medical, psychotherapeutic, or other care or if they reported that their infant cried more or took a long time to fall asleep. Also, burden due to crying, sleeping, feeding, and eating behavior as well as the extent to which bonding was lowered increased along with infant age. As preventive measures in the context of the COVID-19 pandemic, strengthening of intra-family relationships, access to mother-child-specific health care and relief in the care of infants' siblings should be focused on.

In the longitudinal study 2, the role of maternal bonding in the relationship between depressive symptoms and perceived stress during the COVID-19 pandemic in mothers of children aged 0-3 years was investigated. $N = 666$ mothers from Germany were assessed at two measurement time points. Compared to a pre-pandemic sample of healthy and clinically depressed mothers (Reck et al., 2006), in study 2, mothers showed lower bonding quality. This is in line with studies of non-clinical samples from D. V. Fernandes et al. (2021a) and Suzuki (2022). The mothers in study 2 also exhibited a deterioration in bonding from the first to the second measurement. Overall, depressive symptoms and perceived stress were also elevated and increased over the course of the pandemic. This could be associated with greater pandemic restrictions at the later time point (see Woll, 2022; also Ceulemans et al., 2021). Increased maternal depressive symptoms and stress during the pandemic were previously found (e.g., Chmielewska et al., 2021; Racine et al., 2022; Safi-Keykaleh et al., 2022; Suárez-Rico et al., 2021). Significant reciprocal predictions between depressive symptoms and perceived stress were found in the study 2 sample as well. Using cross-lagged panel models (CLPMs), a mediating effect of bonding could be assumed and corroborated. Further mediation and moderation analyses revealed a small partially mediating and a small moderating effect of bonding. Thus, part of the long-term negative effect of maternal depressive symptoms on perceived stress could be shown to be transmitted via lower bonding and further, that the higher the impairment of bonding, the weaker the relationship between depressive symptoms and perceived stress. The positive association between bonding and perceived stress in the study 2 sample indicates a possible protective role of higher bonding concerning maternal mental health in the time of the COVID-19

pandemic. Given the influence of maternal bonding on infant development (Le Bas et al., 2020), it may be a target of preventive measures regarding the psychological well-being of mothers at risk for depression.

In study 3, perceived stress, depressive symptoms and bonding quality of fathers of infants and toddlers (0-3 years) during the COVID-19 pandemic were examined cross-sectionally and longitudinally. To investigate gender differences, these variables were compared to the mothers within a couple. A sample of $N = 173$ fathers from Germany was investigated at two time points. Findings revealed that depressive symptoms at the first measurement point were significantly elevated compared to before the pandemic. Also, with 19.1%, the rate of fathers scoring above cut-off for at-risk depression was significantly higher than before the pandemic. Increased parental depressive symptoms in the pandemic period were previously found by Syed et al. (2022) and Zou et al. (2022). Perceived stress of the study 3 fathers was also significantly increased during the pandemic, similar to findings by Taubman-Ben-Ari et al. (2021). Moreover, paternal bonding in study 3 significantly deteriorated in comparison to before the pandemic, which adds to findings of Andrews et al. (2022). Longitudinally, paternal depressive symptoms and perceived stress remained stable, bonding worsened. There are previous findings that point to greater strain for mothers during the pandemic (e.g., Aguiar et al., 2021; Bıkmazer et al., 2021; Chung et al., 2020). The gender comparison in study 3 showed significantly fewer paternal depressive symptoms and perceived stress, but similar values regarding bonding quality at the first measurement point. Although still less burdened than mothers, the observed persistent deterioration of father's mental health and bonding compared to before the pandemic has to be considered and addressed by further research and by support for families with young children.

In the cross-sectional study 4, the prevalence of perceived stress and depressive symptoms in German students of higher education facilities during the COVID-19 pandemic was investigated. The preregistered assumptions about the increase in depressive symptoms and perceived stress were explored via comparisons with pre-pandemic samples. The final sample was $N = 2960$ students (71.6% female; 26.0% male; 2.4% diverse). It was found that perceived stress was significantly elevated compared to before the pandemic, which is in line with Elmer et al. (2020). Also, there was a significant increase of depressive symptoms, which was previously reported as well (Elmer et al., 2020; Holm-Hadulla et al., 2021; Yu et al., 2021). The rate for a major depressive syndrome in the study 4 students was unexpectedly high with 63.3% (thereof 29.0% above cut-off for moderate, 20.5% for moderately severe and 13.8% for severe major depressive syndrome). Notably, although the used cut-off only implies the presence of a major depressive syndrome and not the clinical diagnosis of a major depression,

the mean of the group above the cut-off in study 4 was compared to a pre-pandemic subsample with diagnosed major depression and the study 4 mean was revealed to be significantly lower. These findings highlight students as a vulnerable group during the pandemic. Suitable support for students in such crisis situations is necessary, for example via regular low-threshold surveys at universities and/or departments, in order to be able to assess and respond to students' needs.

In this work, findings revealed deterioration in different aspects of the investigated (at-risk) populations – but also potential protective factors – and therefore contribute to a better understanding of their condition during the exceptional situation of the COVID-19 pandemic. A background of empirical research can improve development and deployment of adequate support for families and students, to which this work adds further insight.

Chapter 1

Introduction: Investigation of Mental Health and Psychosocial Relations in Maternal, Paternal, Young Children, and Student Populations in the Context of the COVID-19 Pandemic

The COVID-19 pandemic constituted a global, fundamental disruption of daily life and routines. Following the discovery of the first cases of a new type of coronavirus, SARS-CoV-2, in China in December 2019, the World Health Organization (WHO) made its declaration of a pandemic on March 11, 2020, after the declaration of a *Public Health Emergency of International Concern* on January 30 (World Health Organization [WHO], 2023b). At the beginning of January 2023, the WHO listed more than 656 million cases and 6.6 million deaths worldwide since the start of the pandemic (WHO, 2023a). Measures that accompanied the pandemic, such as quarantine, contact restrictions, closures of schools, childcare facilities, and public institutions, curfews, mandatory mask-wearing and transfer of work to home confronted society with enormous challenges. In addition to the physical threat posed by the virus, it soon became apparent that the pandemic and the measures taken to contain it and to reduce the

number of deaths in turn posed a potential threat to psychological well-being. For instance, a rapid review on the effects of (mass) quarantine on mental health was already published at the end of February 2020, with reference to past outbreaks like SARS or Ebola (Brooks et al., 2020). The results showed a predominantly adverse psychological impact of quarantine, such as post-traumatic stress symptoms and sometimes other long-term impact. In addition to quarantine, previously mentioned measures such as contact restrictions, the closure of public facilities, and the wearing of masks characterized the image of the pandemic situation, which may be seen as a traumatic event (Kaubisch et al., 2022). In their systematic review and meta-analysis on mental health problems during the COVID-19 pandemic, Wu et al. (2021) showed an increase in depressive symptoms, anxiety symptoms, insomnia, and distress with a pooled prevalence of 31.4%, 31.9%, 37.9%, and 41.1%, respectively. Different populations were studied. Patients with presumed SARS CoV-2 infection, patients with chronic diseases (not contagious), those in quarantine, physicians and nursing staff were identified as risk groups. Further systematic reviews and/or meta-analyses of Krishnamoorthy et al. (2020), Salari et al. (2020) and Xiong et al. (2020) showed the detrimental effect of the pandemic on the mental health of the general population. Krishnamoorthy et al. (2020) reported diminished mental health at the time of the pandemic with a prevalence of 44% for symptoms related to extremely stressful events (in this case the COVID-19 pandemic), 26% depressive, 26% anxiety and 27% post-traumatic stress symptoms, 40% deterioration in sleep quality, 30% insomnia, 34% stress and 34% psychological distress. Here, COVID-19 patients and healthcare employees seemed to be at-risk groups. Salari et al. (2020) indicated prevalence rates of stress symptoms of 29.6%, anxiety symptoms of 31.9%, and depressive symptoms of 33.7%. To the report of increased prevalence rates of anxiety symptoms (6.3% to 50.9%), depressive symptoms (14.6% to 48.3%), posttraumatic stress symptoms (7% to 53.8%), psychological distress (34.4% to 38%), and stress (8.1% to 81.9%), Xiong et al. (2020) added an analysis of risk groups, which were: women, people of younger age (defined as aged 40 or younger), with chronic illness, mental illness, without employment, with steady consumption of social media and pandemic-related news, as well as students (college). In a large assessment, Kowal et al. (2020) collected data from 26 countries and areas to identify the groups that perceived the most stress in the pandemic period. They found that criteria for higher perceived stress were female gender, younger age, no partnership, having children (the more children, the higher the stress), a lower education level, and living in a region more affected by the pandemic.

Given the different populations affected by mental health problems at the time of the COVID-19 pandemic, it seemed valuable for this work to investigate different popula-

tions with special circumstances as well. Therefore, the focus of the following chapters lies on empirical studies conducted among different participant groups regarding their mental health and, moreover, psychosocial relations during the pandemic. After a theoretical elaboration of the background for the examination of these different groups in this chapter, in chapter 2, infant behavioral problems and maternal psychological burden are explored, the role of maternal bonding in the context of other mental health relevant variables is investigated in chapter 3, in chapter 4 the situation of fathers regarding mental health and bonding is examined, and chapter 5 comprises a study on the mental health of a German student sample (higher education facilities). Finally, in chapter 6, the findings, contributions and specifics of the studies presented are discussed in detail, they are contextualized, clinical implications are embedded, and an outlook on future research is provided.
The targeted populations thus reflect some of the groups defined as at-risk during the pandemic by Kowal et al. (2020) and Xiong et al. (2020), specifically women (mothers in the populations studied), students, and parents. In addition, "younger age" mentioned as a risk factor often applies to both students and parents of infants and toddlers, who are the subjects of this work. Children are referred to as a vulnerable group of their own (Imran et al., 2020).

1.1 Psychological Condition Before the Pandemic

When investigating the psychological well-being of families with infants and toddlers at the time of the pandemic, it is essential to initially look at regulatory processes and infant regulatory problems in the context of parent-child relationship in early childhood. Pre-pandemic parental mental health with a focus on maternal bonding in the context of depressive symptoms and perceived stress as well as paternal depressive symptoms, perceived stress and bonding quality will also be explored, gender differences elaborated, and finally the psychological situation of students of higher education facilities before the pandemic will be described.

1.1.1 Infant Regulatory Problems and Regulatory Processes

Papoušek (2004) assumed that parents have intuitive competencies that enable them to identify their infants' needs and respond to them appropriately. By interacting with the child in a way that is also tailored to the child's abilities, together with the child's corresponding positive reactions, they thus enter into an individual positive regulatory cycle. This is based on the assumption that, in infants, the levels of *arousal*, *activity*,

affect, and *attention* are of central importance in every new experience and are involved in adaptation processes (Papoušek, 2004). Infant regulatory problems play a key role in this context. Wurmser & Papoušek (2004) described the frequent comorbidity of different infant regulatory problems and that there is a risk that they will persist if not treated early. For excessive crying, a prevalence of 16.3% in the first three months of life, 5.8% over 3 months, and 2.5% over 6 months was reported (von Kries et al., 2006). In the same study, eating problems were seen in 1.4% of children in the first year of life and about 3% over the 2nd to 4th year of life. Further, 12.9% of the children had sleeping problems in the first year of life, decreasing to only 1.4% in the 4th year of life.

If parents experience that they cannot calm their child or that the child shows feeding, eating or sleeping problems, it can lead to them feeling weakened in their parenting competences and therefore no longer reacting intuitively, as described by Papoušek (2004). This process is in turn influenced by the parents' own attachment and relationship experiences, which are reactivated in the interaction with the child. If adverse patterns of interaction persist, this can have a negative impact on child development and the parent-child relationship. Additional stressors can complicate adjustments and exacerbate existing problems or burdens during the vulnerable phase of the transition to parenthood (Papoušek, 2004). Another valuable insight is offered by the Mutual Regulation Model (Tronick, 1989, 2003). It is assumed that caretaker and infant regulate each other through emotional exchange in the interaction and that in this dyad, they influence each other in how they perceive and behave emotionally. These interactions pass through different states in which positive and negative affects alternate, as does mutual successful or unsuccessful coordination. Among other factors, child development is linked to the quality and nature of parent-child-interaction, in particular the *reparations of interactive errors* and the regulation of negative affect states. When interactive co-regulation fails over longer time periods, this may have detrimental effects on child development and behavior. Child self-regulation-ability seems to be influential here as well. Mutual regulation may also be adversely influenced by mental health problems of the caretakers (Tronick, 1989).

1.1.2 Parental Mental Health and Bonding

Epifanio et al. (2015) described the transition to parenthood as a *critical life event*. New parents are facing challenges and distress, to which they must adapt as a family. Bonding is centrally meaningful in this dynamic. Klaus & Kennell (1976) specified it as the particular emotional bond a mother develops towards her infant. Brockington

et al. (2006) elaborated on the terminology of bonding, seeing it as the established term for mother-infant relationship and preferring it to the term attachment, which is likely to be confused with the infant's attachment to the mother (also see Dubber et al., 2015). In this work, the same terminology is adapted (except when citing results from studies that refer to instruments that use different terminology, which is then also put into context; when referring to child attachment to the mother, the term attachment is used). In their systematic review and meta-analysis, as well as in a subsequent study, Le Bas et al. (2022, 2020) showed that higher maternal bonding had a positive impact on infant development. Fuchs et al. (2016) also reported on the effect of maternal bonding on child behavioral problems. Since maternal mental health problems can influence both variables, it was controlled for, and it could be shown that maternal bonding quality at 14 months and at 2 weeks predicted child behavioral problems at 5.5 years as assessed by mothers or teachers, respectively. Thereby, lower bonding was related to high values of child behavior problems.

Paternal bonding, in contrast, has been much less researched than maternal bonding (Scism & Cobb, 2017; for an overview: Bicking Kinsey & Hupcey, 2013), even if the father-image was described to be changing regarding higher involvement in a Swedish study (Johansson, 2011). This is also reflected in the literature, where findings indicate that child development and mental health are positively influenced by increased paternal involvement (Barker et al., 2017). In this context, Bronte-Tinkew et al. (2008) found child cognitive development may be positively influenced by early father involvement. Further, in a study of Ramchandani et al. (2013), impaired quality of father-child interaction was positively associated with child externalizing behavioral problems. De Cock et al. (2017) showed that child executive functioning problems can be negatively impacted by parental bonding through parenting stress.

When looking into the potential influence of bonding on the relationship between depressive symptoms and perceived stress, it is relevant to take an insight in how the latter are related. Chow et al. (2019) and Law et al. (2019) found for the early years of motherhood that the robust longitudinal relation between postpartum[1] depressive symptoms and perceived stress shows no distinct direction regarding the effects. Hammen (2005) described that the link between depressive symptoms and perceived stress

[1]The term postpartum is defined as the 4 weeks after birth (peripartum also includes the time of pregnancy) in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013), and the 6 weeks after birth in the International Classification of Diseases (ICD-10; WHO, 1992; ICD-11; WHO, 2019/2021). In scientific publications, this term is often used for a longer period of up to 1 year, sometimes even longer if, for example, the data collection started during pregnancy or after birth over a longer subsequent period (see e.g., Chow et al., 2019). In this work, the latter practice is used.

can be seen as reciprocal in general. Mason et al. (2011) and Reck et al. (2016) found that higher maternal bonding in mothers with postpartum depression can have a protective function regarding parenting stress. It could be shown that lower maternal bonding is related to more depressive symptoms (e.g., Tichelman et al., 2019) and more parenting stress (e.g., de Cock et al., 2017). However, parenting stress is not to be equated with perceived stress in general. Parenting stress as a construct captures mainly child-related stress experiences, while perceived stress captures rather overall stress experiences. In addition to bonding, relationship satisfaction may also be seen as a protective factor concerning the development of stress in early parenthood (Fakhri et al., 2019).

Comparing stress levels between mothers and fathers reveals an inconclusive picture. There were studies that found no gender differences in stress of new parents (within the first 6 months; Gao et al., 2009; Mao et al., 2011; Seah & Morawska, 2016). If differences were found, they suggest that mothers are more stressed than fathers (Hildingsson & Thomas, 2014; Pancer et al., 2000; Wang & Chen, 2006). This pattern could also be shown for parenting stress (Matvienko-Sikar et al., 2018), and further, that paternal health status and attachment quality regarding the child (bonding) were negative predictors for parenting stress. Saisto et al. (2008) found that depressive symptoms peri- and postpartum in mothers and fathers predicted parental stress 2-3 years after birth.

When comparing depressive symptoms in parents, mothers also seem to be more affected. While rates for postpartum at-risk depression in fathers – using the cut-off value over 9 of the Edinburgh Postnatal Depression Scale (EPDS) – were reported at 7.8% (Gawlik et al., 2013) or 8.7% (Kerstis et al., 2012), regarding mothers they have been reported between 16.5% and 23.6% (Kerstis et al., 2012; Reck et al., 2008; von Ballestrem et al., 2005). Another difference seems to occur regarding the time of onset of depressive symptoms: Fathers are more likely to show these symptoms when their child is 3-6 months old (Paulson & Bazemore, 2010), mothers more shortly after birth (von Ballestrem et al., 2005). Wee et al. (2011) found associations between depressive symptoms peri- and postpartum in (future) fathers and depressive symptoms in their partners, as well as low paternal relationship quality and social support. Ramchandani et al. (2008) indicated that own past depressive episodes, prepartum depressive (and anxiety) symptoms, or maternal prepartum depression may increase the risk for paternal postpartum depressive symptoms. In addition, a relationship was shown between paternal depressive symptoms 8 weeks after birth of their child and later child psychopathology (at age 7).

1.1.3 Student Mental Health

As already mentioned, students of higher education facilities tend to belong to a younger age group. Arnett et al. (2014) described age 18 to 29 (in high-income countries) as a period characterized by less consolidated living conditions and increased instability. Weber et al. (2020) also considered the period during studying, which is often seen as a carefree, enjoyable phase in life, as a time in which students have to master many new and frequent challenges, such as academic requirements or living alone for the first time. Additionally, results from Cavallo et al. (2016) and Rueckert & Ancane (2018) indicated that students can be considered a vulnerable group. Thus, in comparison to the general population, more perceived stress (Cavallo et al., 2016), depressive and anxiety symptoms (Rueckert & Ancane, 2018) were reported for students. The aforementioned study from Weber et al. (2020) found one or more psychological syndrome(s) in 53.6% of a sample of German students, with depressive symptoms being the most common (nearly a quarter). Other findings were that students screening positive for psychological symptoms were more likely to have thoughts of discontinuing their academic studies, especially among students with depressive symptoms and suicidal tendency.
In a study by Bailer et al. (2008), probable alcohol abuse or dependence was found to be the most prevalent among students, with 30.2%. When this was excluded, 22.7% of the students showed at least one of the psychological syndromes that were surveyed. Again, depressive symptoms were the most prevalent, as they were in the large-scale WHO study of Auerbach et al. (2018), where major depression among first-year students occurred with a lifetime prevalence of 21.2% and a 12-month prevalence of 18.5%. Rueckert & Ancane (2018) found depressive symptoms in 41.8% and 20% of Latvian and international students, somatic symptoms in 40.3% and 36%, and anxiety in 31.3% and 14%, respectively. In a study with Luxembourgian and German students (9.7% and 90.3%; Schlarb et al., 2017), increased sleeping problems (poorer sleep quality in 42.8%, 17.9% clinically relevant) were the predominant symptoms. A depressive syndrome was reported for 25.5%, social phobia symptoms for 13.3% and increased stress for 45% of the students.

1.2 Psychological Condition During the Pandemic

As described above, additional stressors can negatively influence the process of becoming a parent (Papoušek, 2004). This becomes particularly relevant in the context of living under pandemic conditions. Since mutual regulation may also be influenced

by mental health problems of the caretakers (Tronick, 1989) and child development and behavioral problems may be influenced by parental mental health problems and bonding or quality of the parent-child-relationship (e.g., Bronte-Tinkew et al., 2008; Fuchs et al., 2016; Le Bas et al., 2022; Le Bas et al., 2020; Ramchandani et al., 2008) it is of particular importance looking at the psychological well-being of parents of infants of toddlers during the pandemic. Maternal bonding in the context of depressive symptoms and perceived stress as well as paternal depressive symptoms, perceived stress and bonding quality, gender-specific differences and the situation of the entire family system will be examined and further, the impact of the pandemic on children considered. Finally, a closer look is taken at the vulnerable group of students of higher education facilities (Xiong et al., 2020) at the time of the pandemic.

1.2.1 Family Well-Being and Burden

When turning attention to family systems, detrimental effects of the COVID-19 pandemic become visible (Eales et al., 2021; Gadermann et al., 2021; Prime et al., 2020; Soejima, 2021). Prime et al. (2020) assumed that the COVID-19 pandemic would have a lasting and pervasive impact on the social structure of society, with risks at different levels triggering a cycle of subsequent problems. Everyday life for families has changed in many cases and ways, with its own specific challenges and requirements. In addition, the mental health of parents or caregivers may be affected as a result of the strain caused by the pandemic, and thus parental skills may also be compromised. Prime et al. (2020) further suggested that this affects the parent-child relationship and hence the child's ability to adapt to the changed conditions. This process is in turn particularly influenced by the protection and risk factors, vulnerabilities and disadvantages a family system entails (see figure 1.1). In their scoping review, Soejima (2021) described not only the adverse impact of the pandemic on family well-being, but also the issue of rising incidences of intimate partner violence and child abuse and neglect. The author related this to altered family routines and the problems that may accompany them. An additional concern is seen in the adverse effect that psychological distress may have on physical health and social problems. Verger et al. (2021) stated that families under lockdown conditions are more affected by violence and abuse, too, but also by chronic health problems. In their mixed methods study, Eales et al. (2021) compared the pandemic's comprehensive and pervasive impact on families to a ”sledgehammer” (Eales et al., 2021, p. 1578). Nevertheless, in qualitative and quantitative analyses, they found various indications of the resilience of families with regard to life under pandemic conditions. These include experiencing positive changes or handling adverse

changes effectively. For instance, parents noticed improvements in their children, such as the development of new habits or skills, and parents found new ways to provide childcare. Gadermann et al. (2021) reported though that in the context of pandemic-related deterioration in family psychological well-being, parents of younger children are among those at risk. The authors suggested that the increase in both positive and negative interaction is primarily due to the fact that there was more contact with each other in general.

1.2.2 Parental Mental Health and Bonding

The circumstances of parents have deteriorated during the COVID-19 pandemic, as the challenges presented by the pandemic, such as closures of schools and daycares, and the consequences for the family's everyday life, directly affected them. Among the reported issues for parents during the pandemic were reduced well-being – particularly for parents with young children – increased parenting stress, caregiver burden, and mental health problems (e.g., Almeida et al., 2020; Hiraoka & Tomoda, 2020; Huebener et al., 2021; Russell et al., 2020). Furthermore, Geissler et al. (2022) described that parents in their sample felt increasingly helpless about their parental role and inadequate in meeting the needs of their children during the pandemic.

Studies of parental bonding or parent-child-relationship in the time of the COVID-19 pandemic are still rare (even more so for fathers; Trumello et al., 2021) and their results are inconclusive, also with regard to a possible protective role of bonding, as investigated earlier by Mason et al. (2011) and Reck et al. (2016). Suzuki (2022) and D. V. Fernandes et al. (2021a) reported lower maternal bonding during the pandemic, Andrews et al. (2022) impaired initial paternal bonding due to partner exclusion from maternity care. Layton et al. (2021) reported that maternal bonding quality did not worsen when compared to pre-pandemic levels, although the group of mothers investigated were seeking treatment, and were more likely to exhibit more severe depressive symptoms or postpartum depression than before the pandemic. For fathers, an improvement in the father-child relationship was reported (J. Hu et al., 2022), partly, because fathers felt closer to their children (Weissbourd et al., 2020; noted for 68% of fathers).

Studies reported an increase in maternal depressive symptoms (in non-clinical populations) during the pandemic (e.g., Davenport et al., 2020; Fallon et al., 2021; Racine et al., 2022; Safi-Keykaleh et al., 2022), and an increase in parental depressive symptoms in general (Syed et al., 2022; Zou et al., 2022). In the aforementioned studies from Suzuki (2022) and D. V. Fernandes et al. (2021a), maternal depressive symptoms were

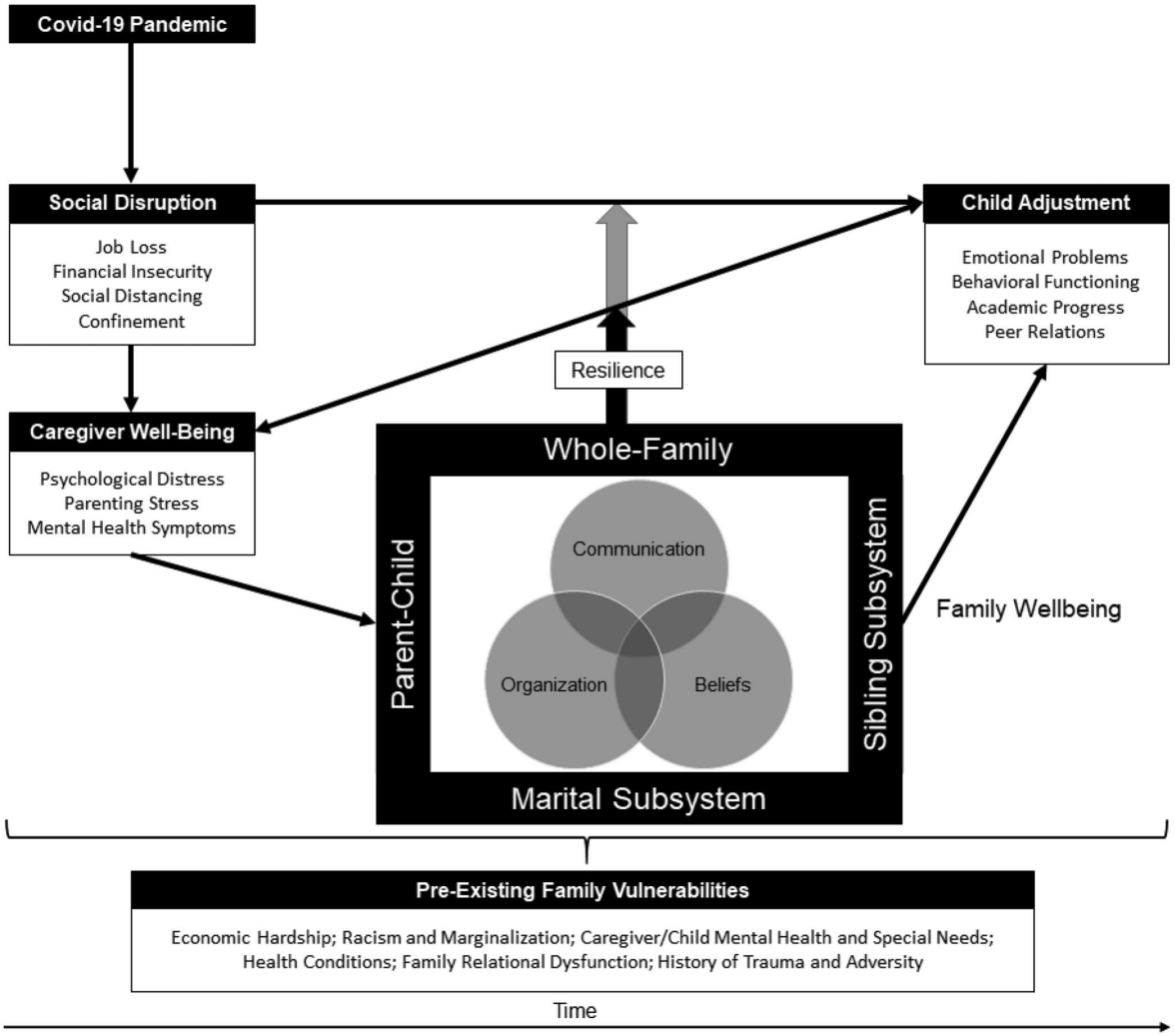

Figure 1.1: Prime and colleagues representation of processes how the COVID-19 pandemic affects the family system (Prime et al., 2020, p. 633).

reported to be not elevated during the pandemic. For fathers, it was found that they show fewer depressive symptoms compared to before the pandemic (van den Heuvel et al., 2022). Studies reported more depressive symptoms for mothers than they do for fathers during the pandemic (Bıkmazer et al., 2021; Brym et al., 2022; for women in pregnancy up to 6 months postpartum: Tavares et al., 2021), as well as no gender differences (Cheung et al., 2022), but also more depressive symptoms for fathers (Russell et al., 2020).

When it comes to the experience of stress during the pandemic, Suárez-Rico et al. (2021) reported perceived stress to be elevated for mothers and Taubman-Ben-Ari et al. (2021) for fathers regarding parenting stress. Additionally, Taubman-Ben-Ari et al. (2021) found that paternal parenting stress was higher than mothers' parenting stress exclusively during the pandemic. Similarly, Ben-Yaakov & Taubman-Ben-Ari (2021) indicated that fathers of children aged 7-12 months, in comparison to children aged 1-6 months, showed more parenting stress than mothers. In addition, fathers showed a notable increase in burnout and exhaustion during the pandemic, although rates were higher for mothers overall (but tended to be stable during the pandemic; Aguiar et al., 2021). In the previously mentioned study by Tavares et al. (2021), there were no gender differences regarding perceived stress.

When taking a closer look at longitudinal investigations of parental psychological well-being, there are more studies targeting mothers. Even in studies, in which fathers are included in parental samples, the majority of participants are mothers. Compared to pre-pandemic times, an overall increase of parental perceived stress and a decrease during the course of the pandemic was found (Adams et al., 2021). Additionally, parenting stress was mostly reported to be higher than before the pandemic, and increased during the pandemic for more than a half of the sample. In another longitudinal survey, more paternal than maternal depressive symptoms were reported (Russell et al., 2021). Further, an improvement regarding maternal depressive symptoms and bonding was found during the pandemic; bonding was only improved if depressive symptoms were not controlled for (D. V. Fernandes et al., 2021b). To the best of the author's knowledge, currently, no pandemic-specific study has considered maternal depressive symptoms, perceived stress, or bonding together during the first years of motherhood. Regarding the mentioned improvement of depressive symptoms and bonding, it was suspected that this might be due to loosened pandemic restrictions. There are also other studies that indicate lockdown-related adverse effects on maternal mental health, such as J. Fernandes et al. (2022) or Gordon-Hacker et al. (2022). It can be hypothesized that bonding is affected as well in this context. Furthermore, positive effects on parental stress and psychological well-being were shown with fewer pandemic restrictions (M. S.

Johnson et al., 2021), as well as on parental stress and emotional well-being of children, even if family well-being and parent-child-relationship deteriorated (Essler et al., 2021). Daks et al. (2022) assumed the decrease of parental depressive symptoms and *family chaos* may be associated to families adapting to the new situation.
Finally, Tavares et al. (2021) found higher perceived stress for expectant fathers and fathers at 6 months postpartum (8.50%) during lockdown conditions in comparison to expectant fathers and fathers who were not under lockdown conditions. Additionally, higher parenting stress was found for fathers living in a severely COVID-19 affected area (Trumello et al., 2021).

1.2.3 Child Mental Health

In a study of mothers who gave birth during the pandemic (infant mean age 7.14 months), infant regulatory problems were assessed in the areas of crying, sleeping, and feeding (Reinelt et al., 2022). It was shown that mothers of this sample report more infant regulatory problems compared to a pre-pandemic non-clinical sample, but not compared to a clinical sample. Also Perez et al. (2021) indicated an increase in infant crying and sleeping problems (but not in feeding problems) compared to a pre-pandemic control group. In a study of Zreik et al. (2021), about 30% of mothers reported diminished sleep quality and reduced sleep duration for their children (from 6 months) during the pandemic, while 12% of mothers perceived an improvement regarding sleep quality. Poorer sleep quality at the beginning of the pandemic, during the greatest restrictions, was also shown in a study from Markovic et al. (2021) with two groups of young children (0-35 months and 36-71 months). The sleep behavior had stabilized again by the time of the subsequent measurements. In a German cross-sectional study examining mental health problems in children aged 0-3 during the pandemic, elevated rates of feeding problems were reported for 34.8% of infants, crying and sleeping problems for 26.2%, and multiple regulatory problems for 13.5% (Buechel et al., 2022). Emotional and behavioral problems were shown by 8.5% of toddlers, which appeared to be not elevated compared to pre-pandemic levels.
Psychological distress in older children and adolescents also seems to have become apparent in the context of the pandemic (e.g., Cost et al., 2022; Kauhanen et al., 2022; Panda et al., 2021; Ravens-Sieberer et al., 2022; Waite et al., 2021). A Canadian study on the influence of pandemic-related measures on children and adolescents' mental health revealed that 67-70% exhibited a worsening in one or more domains, depending on age (total span: 2-18 years; Cost et al., 2022). Children with and without previous psychiatric disorder were examined and although both groups experienced poorer

mental health, this was more common in the group with previous psychiatric disorder. In a study from Bangladesh, with 21.5%, more emotional and behavioral problems were found in children and adolescents (4-17 years) than before the pandemic (Syed et al., 2022). The German longitudinal COPSY study (Corona und Psyche; corona and psyche) showed worsened health-related quality of life and mental health problems for children and adolescents aged 7-17 years (Ravens-Sieberer et al., 2022). A deterioration in both categories compared to before the pandemic was followed by further deterioration at the second measurement point, followed by a slight recovery at the third measurement point. As already mentioned regarding the course of mental health problems of parents and child sleeping problems, the authors considered here, too, whether this could have something to do with loosened measures and moreover a generally more eased pandemic situation at that time. Among other things, children with psychologically distressed parents seem to be more frequently affected by the pre-stated deteriorations. Walper & Reim (2020) reported that adolescents (16-20 years) perceived a worsened family climate during the pandemic more often than its improvement. Nearly 40% reported increased loneliness, though almost as many reported reduced stress.

1.2.4 Student Mental Health

For students of higher education facilities at the time of the pandemic, the psychological effects of studying under such changed circumstances become apparent. Besides contact restrictions and limitations in daily life, students were often confronted with new conditions they needed to adapt to, such as the transition to online teaching or changed examination formats (Diel et al., 2021). Mental health problems of students are reflected in different studies. For example, Holm-Hadulla et al. (2021) reported an increase in depressive symptoms among students compared to before the pandemic, 72.2% of the students stated that their well-being was noticeably affected, and for 75.8% one or more mental health issues were assumed. Depressive syndromes were found most frequently, with 59.1%. Barbosa-Camacho et al. (2022) showed a high rate of reported depressive syndromes, too (61.5%). Overall, students perceived anxiety or depressive symptoms in more than 80% of the cases. Also, Yu et al. (2021) indicated elevated depressive symptoms in students with 55.8%. However, positive developments in the pandemic, such as regarding competitive behavior and *Fear of Missing Out,* were also reported by students (Elmer et al., 2020). In the same sample (engineering/natural sciences students) also an increase in perceived stress, depressive and anxiety symptoms as well as loneliness were seen. In contrast, Benham (2021) found lower levels of

perceived stress in students during the pandemic.
Longitudinal data on students of Charbonnier et al. (2021) showed an increase in depressive and anxiety symptoms during the pandemic. Here, too, the pattern that they were more severe during lockdown phases emerged. Notably, anxiety symptoms were also severe at university reopenings. In a cross-national longitudinal study of the prevalence and sociodemographic predictors of psychological distress among young adults (20-40 years) at the time of the pandemic, student status was found to predict depressive symptoms and suicidal and self-harm thoughts (Benatov et al., 2022). This further highlights the fact that students can be seen as a particularly vulnerable group in the time of the COVID-19 pandemic.
This can also be considered in the sense of the diathesis-stress model (Broerman, 2020; Petermann et al., 2018). Here, it is assumed that psychopathological development depends on an interplay between vulnerability and stressors specific to individual life events. In this case, the student status could be seen as a risk factor in and of itself, and with the additional pandemic-related stressors, (further) threshold points can be exceeded, which then leads to the manifestation of psychopathology.

In the following, four different studies are presented in which different (at-risk) populations were examined at the time of the COVID-19 pandemic. The first three studies belong to the CoviFam survey (with a focus on families), the last one to the CoviStud survey (focusing on students).
The core research questions addressed (1) the investigation of infant behavioral problems in the vulnerable first year of life and maternal psychological burden during the COVID-19 pandemic, assuming an increase of infant behavioral problems and maternal psychological distress. (2) The particular influence of maternal bonding on the relation between depressive symptoms and perceived stress over the course of the pandemic in mothers of children aged 0-3 years was examined, presuming a deterioration of bonding quality. (3) Perceived stress, depressive symptoms and bonding quality of fathers of children aged 0-3 years during the pandemic were investigated in order to identify a potential change in these variables compared to before the pandemic, possible gender differences and the development of the key variables over the course of the pandemic. (4) An examination of the prevalence of perceived stress and depressive symptoms in German students of higher education facilities during the pandemic was conducted, with the hypotheses that depressive symptoms and perceived stress are increased in comparison with pre-pandemic samples.

Approval for all of these studies was granted by the Ethics Committee of the Medical Faculty, Ruprecht Karl University, Heidelberg, in agreement with the Ludwig Maxi-

milian University, Munich (vote: S-446/2017; as part of a larger project). Data sets, reproducible analysis scripts, codebooks and further supplementary material are available at https://osf.io/gvh4d/?view_only=8f1aa76f06014a3abe18fa07efd8ac7e.

Chapter 2

Study 1: Infant Behavioral Problems in the First Year of Life and Maternal Psychological Burden During the COVID-19 Pandemic

The first study aimed to investigate potential infant behavioral problems (crying, sleeping, and feeding/eating behavior) in the vulnerable first year of life and the associated maternal psychological burden during the COVID-19 Pandemic, including the time of greatest restrictions, cross-sectionally. Maternal depressive symptoms and perceived stress, as well as bonding and relationship satisfaction as potential protective factors, were also examined (e.g., Fakhri et al., 2019; Reck et al., 2016). It is a previously published German article from the CoviFam survey (von Tettenborn et al., 2022), which has been translated and adapted for English presentation in this work. For this purpose, a differentiated elaboration on the use of the terminology in the context of infant regulatory problems was carried out, which is described in more detail in chapter 6. The original publication (open access) can be found in the appendix A.

2.1 Theoretical Background

The COVID-19 pandemic affects the psychological well-being of children and their entire families in multiple ways. The drastic measures taken to limit contact at the onset of the pandemic may trigger a cascade of subsequent problems, according to

the risk and resilience model in the COVID-19 pandemic by Prime et al. (2020). In particular, social changes – isolation, altered routines, short-time working[1], home office, lack of family or external child care, insufficient professional support, for example with practical breastfeeding issues (Vazquez-Vazquez et al., 2021) – can lead to lower family well-being (more family "chaos": A. D. Johnson et al., 2022; increased depressive and anxious symptomatology, increased stress: e.g., Ceulemans et al., 2021). When the entire family system is stressed, it can negatively impact the parental ability to co-regulate infant stress and affect. The result can be a vicious circle in which infants show increased problems in regulation and parents seemingly lose confidence in their own parenting abilities and make dysfunctional or less calming attempts (model of reciprocal regulation according to Papoušek, 2004).

In this context, infant behavioral problems often can be seen in the areas of crying, sleeping, and feeding and predict psychological problems or developmental deviations in later childhood (Schmid et al., 2010). Maternal psychosocial distress and elevated experience of stress predict increased problems in infants' emotional and behavioral regulation (Schmid et al., 2011).

The aim of this explorative study was to assess the living situation of families with young children during the pandemic, including the time of greatest restrictions, with a focus on possible problems in crying, sleeping, and feeding/eating behavior among the infants and the associated psychological burden these problems and behaviors create on their mothers. In addition, the mothers' depressive symptoms and perceived stress were assessed, as they are closely related to the development of infant regulatory problems. Bonding, that is, the maternal experience of a relationship or bond with her child, and relationship satisfaction were also surveyed as potentially protective factors for the development of stress in early parenthood (e.g., Fakhri et al., 2019; Reck et al., 2016). The hypotheses we postulated here were that both infant behavioral problems in the first year of life during the COVID-19 pandemic and mothers' baseline level of psychological distress (depressive symptoms, perceived stress) are increased, and that all these variables are associated with each other.

[1] *Kurzarbeit* is a German social insurance program whereby employers reduce their employees' working hours (usually to 60%) instead of laying them off.

2.2 Method

2.2.1 Sampling Procedures and Participants

The present sample was derived from an anonymous online survey of a total of 1935 caregivers of children aged 0-3 years on the impact of the COVID-19 pandemic. The study was conducted at the sites in Munich and Heidelberg. Parents were reached primarily through pediatric and gynecologic practices, maternity clinics, and midwifery networks, as well as social media. Between July and November 2020, 577 mothers from Germany and Austria with infants aged up to 12 months participated. The conditions of the first lockdown were similar in both countries (starting in March 2020, curfew and contact restrictions, masking requirement, quarantine rules, gradual relaxation from Easter). Mothers were aged 19 to 44 years ($M = 31.77$, $SD = 4.0$; $n = 23$ not reported), and infants were in their first year of life ($M = 7.26$ months, $SD = 3.25$, 0-12 months; 52.3% male). At least one other child lived in 44.3% of the households. The mothers' education was higher than average: 66.6% had German Abitur, 16.1% German Fachabitur, 15.6% German Realschule diploma, 1.6% German middle school diploma and 0.2% left school without diploma.[2] The parents mostly lived together (97.2%). The majority of mothers (60.0%) was on parental leave at the time of the survey. Of the mothers who were not on parental leave, 29.0% were key workers.

2.2.2 Measures

A self-developed questionnaire (Reck et al., 2020) was applied, including retrospective questions to capture infant behavioral problems and the associated burden during the time of the greatest restrictions. Questions about excessive crying were not assessed retrospectively. Questions about changes in the family living situation and concerns about the infant were also asked, in part, retrospectively. Depressive symptoms, perceived stress, bonding and relationship satisfaction were surveyed for the intended period for which the questionnaires were developed in order not to limit the validity of the measurement instruments.

[2]In this work, the terms *University entrance qualification* (*German Fachabitur* and *German Abitur*), *high secondary qualification*, *low secondary qualification*, and *no school leaving qualification* are also used for the terms listed here. *German middle school diploma* means *German Hauptschulabschluss*.

Infant Behavior and Associated Maternal Burden

Infant behavior in the areas of crying, sleeping, feeding/eating were assessed with both open and closed questions, mainly adapted from the Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (DC:0-5; ZERO TO THREE, 2016) disorder categories. According to Wessel's rule of three (Wessel et al., 1954), adapted by DC:0-5 ("Excessive Crying Disorder"), crying is considered excessive if it lasts longer than 3 hours per day (24 h), more frequently than 3 days per week, and longer than 3 weeks. Because infantile crying can be burdensome even if it lasts for a shorter period of time, additional questions were asked regarding whether the infant cries very frequently and is difficult to calm or is frequently upset. It was also asked retrospectively if the infant cried (including fussing, high-pitched crying, screaming, unexplained crying) more at the time of greatest restrictions (1 = "not at all" to 5 = "very much").

Clinically relevant sleep onset latency was determined by following the cut-off values (90^{th} percentile) found by Paavonen et al. (2020), that is, if the infant took longer than 90 minutes (from 3 to 6 months), longer than 60 minutes (from 6 to 8 months), and longer than 45 minutes (from 8 months on) to fall asleep. Problems staying asleep during the night were defined as night awakenings more often than 3 times per night and longer than 30 minutes in infants from 8 months of age on (see "Night Waking Disorder" in DC:0 -5; ZERO TO THREE, 2016). It was additionally asked whether the infant took longer to fall asleep at the time of greatest restrictions and whether they woke up more frequently during the night (1 = "not at all" to 5 = "very much").

Feeding and eating problems were asked following the A criterion of the "Avoidant/ Restrictive Food Intake Disorder" of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013), specifically to what extent the infant showed restrictive food intake, a lack of interest in eating or food, an inability or refusal to eat sufficient quantities or variety of food and an increased sensitivity regarding the characteristics of the food at the time of greatest pandemic restrictions (each 1 = "not at all" to 5 = "very much").

In addition, the mothers were asked – also for the time of greatest pandemic restrictions – how burdened they felt due to the infant's behavior (crying, sleeping and feeding/eating behavior), regardless of the duration or intensity of the behavior.

Maternal Depressive Symptoms and Perceived Stress

Maternal depressive symptoms were assessed with the German version of the Edinburgh Postnatal Depression Scale (EPDS; Bergant et al., 1998). This allows self-assessment

of symptoms of postpartum depression (at a cut-off $\geq$ 10 risk of a minor depressive episode, at $\geq$ 13 risk of a major depressive episode) via ten items with four response options (severity 0-3). In the present sample, Cronbach's α equals .87.
The Perceived Stress Scale (PSS-10; Reis et al., 2019) was used to assess stress experience, that is, the degree to which a situation is appraised as uncontrollable, unpredictable, or overwhelming in the face of one's coping abilities. It comprises ten items on a 5-point Likert scale (0 = "never" to 4 = "very often"). Higher sum scores indicate increased stress levels. In the present sample, Cronbach's α equals .87.

Bonding

Bonding with the infant was assessed with the abridged German version of the Postpartum Bonding Questionnaire (PBQ, Brockington et al., 2001; PBQ-16, Reck et al., 2006). A total of 16 statements regarding the maternal experience of the relationship with her child are answered on a 6-point Likert scale (0 = "always" to 5 = "never"). Higher scores indicate more impaired bonding. In the present sample, Cronbach's α equals .85.

Relationship Satisfaction

Relationship satisfaction was assessed using the short form of the Partnership Questionnaire (PFB-K; Kliem et al., 2012). A total of nine statements about partner behavior are assessed on a 4-point Likert scale (0 = "never/very rarely" to 3 = "very often"). The tenth item assesses perceived happiness in the relationship on a 6-point Likert scale (0 = "very unhappy" to 5 = "very happy"). The Partnership Questionnaire (PFB-K) yielded a Cronbach's α of .85 in this sample.

2.2.3 Statistical Analysis

The changes in the family life situation due to the pandemic-specific restrictions, the data on infant behavior, and the frequencies of infant behavioral problems based on the clinical criteria, as well as maternal burden due to the crying, sleeping, and feeding/eating behavior of the infant are first presented descriptively. The intercorrelations of maternal burden and infant behavior were calculated using Pearson's correlations. One-sample t-tests were performed to compare the mean values of the standardized questionnaires of the sample with values from normative or representative samples.
The associations between pandemic-specific restrictions and maternal burden due to crying, sleep, and feeding/eating behaviors, as well as perceived infant behavioral prob-

lems during the time of greatest restrictions, that is, (1) cried more, (2a) took longer to fall asleep at night, (2b) woke up more often at night, (3) showed restrictive food intake, were tested using MANOVAs.

A set of hierarchical multiple linear regressions (approach: backwards elimination) was applied to explore the extent to which mothers' burden due to infant crying, sleeping, and feeding/eating behavior (not using the clinical criteria) could be explained by perceived stress and depressive symptoms as well as by bonding and partnership satisfaction. Here, the respective burden due to infants' behavior was the dependent variable, and the sum scores of the PSS-10, EPDS, PBQ-16, and PFB-K questionnaires were the independent variables (predictors). A variable was eliminated as a predictor if the empirical Type 1 error probability for excluding the variable was $p \geq .10$. This allows predictors with small but potentially significant effects to remain in the model. Another MANOVA was calculated to examine how maternal psychological burden differed with regard to the following independent variables and their interaction terms: (1) infant age (in months), (2) infant's sibling, and (3) mothers reporting increased crying as "severe" or "very severe" and prolonged sleep onset latency (> than 45 minutes) during the time of greatest restrictions. Maternal psychological burden included the following dependent variables: reported extent of burden due to infant crying, sleeping, and feeding/eating behavior, as well as the sum scores of the questionnaires PFB-K, PSS-10, EPDS, and PBQ-16.

2.3 Results

Pandemic Restrictions and Associations With Maternal Burden and Infant's Behavior

Most of the mothers reported changes in their daily life situation: Job-related changes were less apparent among the mothers (28.4%), but more so among the fathers (66.6%), predominantly due to a transfer of work to the home office (41.2%) or short-time working (15.5%). Reduced contact to their own parents, to family members, and to friends was reported by 79.5%, 88.7%, and 92.5% of the mothers, respectively. In families in which the net household income was reduced (23.2%), the reduction averaged 29.2% (SD = 18.4). These restrictions did not significantly affect retrospectively reported maternal burden due to infant crying, sleeping, and feeding/eating behavior ($F(3,570) \leq 1.04$, $p \geq .413$), nor infant behavioral problems at the time of greatest pandemic restrictions ($F(4,572) \leq 2.16$, $p \geq .072$) reported by the mothers, that is, infants (1)

cried more, (2a) took longer to fall asleep at night, (2b) woke up more often at night, (3) showed restrictive food intake.

Nearly a quarter (23.6%) of mothers experienced a lack of medical, psychotherapeutic, or other care. Regarding this lack of care, there were significant multivariate main effects on both maternal burden due to infant behavior (crying, sleeping, feeding/eating; $F(3,573) = 7.68$, $p < .001$, $\eta_p^2 = .04$) and mothers' reports on infant behavioral problems at the time of greatest restrictions ($F(4,572) = 3.30$, $p < .05$, $\eta_p^2 = .02$). The mothers who reported experiencing a lack of care reported significantly higher levels of burden due to crying ($M = 2.94$, $SD = 1.45$), sleeping ($M = 2.51$, $SD = 1.49$), and feeding and eating behaviors ($M = 1.94$, $SD = 1.35$; $F(1,575) \geq 6.71$, $p \leq .05$). Similarly, mothers who reported a lack of care reported significantly more infant crying ($M = 2.11$, $SD = 1.36$), problems falling asleep ($M = 2.18$, $SD = 1.46$) and staying asleep ($M = 2.07$, $SD = 1.41$), and eating and feeding problems ($M = 1.51$, $SD = 1.05$) than mothers who did not experience a lack of care ($F(1,575) \geq 4.08$, $p \leq .05$). None of the mothers reported having been infected with COVID-19. However, 41.4% stated very strong concerns about a potential infection in the family. Alongside the potential stressors, 66.9% also experienced opportunities as a result of the pandemic situation. For instance, 31.4% stated that they had more time for their infant because their own appointments and obligations fell through, 27.4% because their partner was at home more, 3.5% because they worked less and 7.6% because they did not work at all.

Infants' Behavior and Links With Maternal Burden

The clinical criteria of "Excessive Crying Disorder" (Wessel's rule) were met by 9 of the 577 infants (1.6%) at the time of the survey. This is a lower proportion compared to prevalence rates of a German sample (16.3% of infants within the first 3 months of life, from 3 months 5.8%, from 6 months 2.5%; von Kries et al., 2006; collected via telephone screening). The question whether the infant cries very often and is difficult to calm was answered affirmatively by 12.3% of mothers (figure 2.1). Regardless, more than one in four mothers (28.7%) reported being "severely" or "very severely" burdened due to crying at the time of greatest restrictions (figure 2.2).

During the greatest restrictions, nearly one in four infants (21.7%) showed sleeping problems. Clinically relevant sleep onset latency was found in 11.5% of three- to six-month-olds, in 46.9% of six- to eight-month-olds, and in 45.3% of over-eight-month-old infants (figure 2.1). Increased night awakenings were exhibited by 11.1% of infants over 8 months of age. In the study cited above, using a less strict definition, 12.9% of

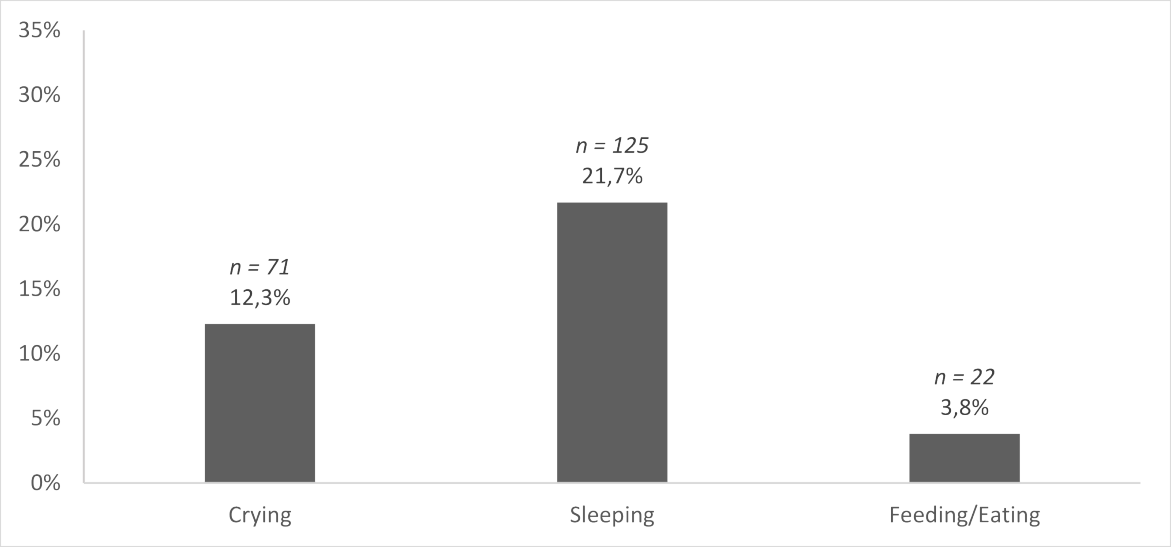

Figure 2.1: Maternal reporting of infant behavioral problems (crying, sleeping, feeding/eating). Number/percentages of infants whose crying was rated as "increased or difficult to calm", of infants with problems falling asleep and/or staying asleep, and with feeding/eating problems. $N = 577$ (2 missings in the "sleeping" domain).

infants up to 1 year old were assessed as having poor sleep von Kries et al. (2006). In addition, almost one in five mothers (19.3%) reported having been "severely" or "very severely" burdened due to their infant's sleep behavior (figure 2.2).

According to the mothers, a total of 3.8% of all infants showed eating and feeding problems during the greatest restrictions (figure 2.1) versus 1.4% in von Kries et al. (2006). In addition, 8.9% of mothers reported "severe" or "very severe" burden due to their infant's feeding/eating behavior (figure 2.2).

In addition to the clinical criteria, changes in infant behavior at the time of greatest restrictions were assessed via questions on the extent to which the infant (1) cried more, (2a) took longer to fall asleep at night, (2b) woke up more often during the night, and (3) showed restrictive food intake. These infant behaviors correlated positively with each other ($r(577) \geq .47$, $p \leq .001$). Similarly, maternal burden due to either crying, sleeping, and feeding/eating behavior during the time of greatest restrictions intercorrelated positively ($r(577) \geq .52$, $p \leq .001$).

Depressive Symptoms, Perceived Stress, Bonding and Relationship Satisfaction

Concerning the screening for depressive symptoms (EPDS: $M = 7.53$, $SD = 5.45$), 33.3% of mothers were above the clinical cut-off (≥ 10), with 13.5% being in the range

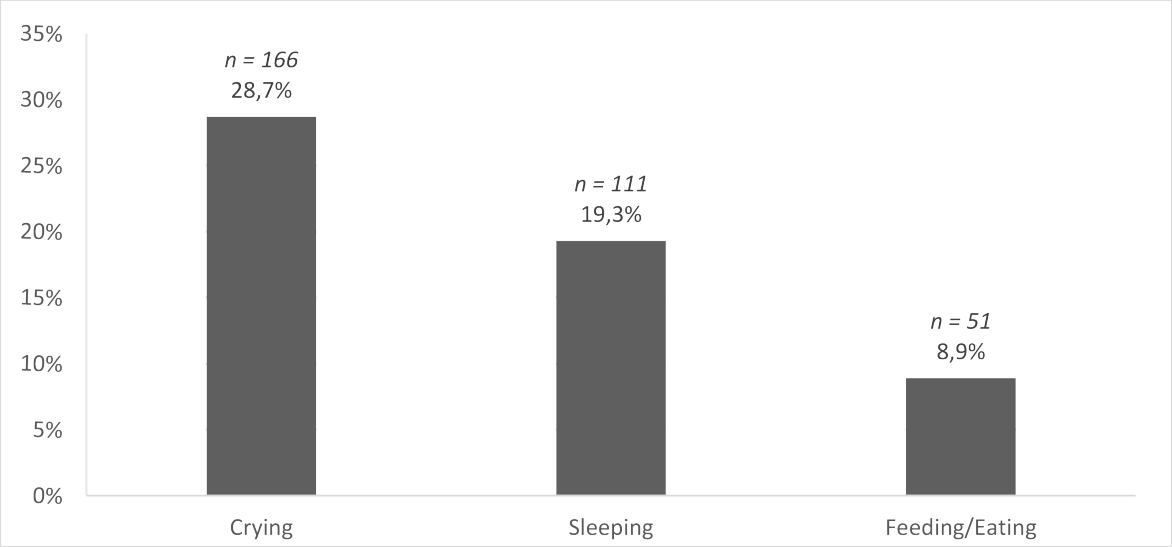

Figure 2.2: Maternal burden concerning infant behavioral problems (crying, sleeping, feeding/eating). Frequencies of reported maternal burden as "severe" or "very severe" due to infant crying, sleeping, feeding/eating behavior (n, %). $N = 577$, no missing data.

of risk for developing a minor depressive episode (≥ 10 and < 13) and 19.8% being in the range of a major depressive episode (≥ 13). These rates are increased compared to studies with mothers in the first three months (17% in von Ballestrem et al., 2005; 23.6% in Reck et al., 2008). Perceived stress (PSS-10: $M = 17.65$, $SD = 6.71$) was significantly higher ($t(576) = 15.41$, $p < .001$, $d = 1.28$) compared to the norm sample (of women aged 20-39 years, but in a different translation: Klein et al., 2016). Bonding (PBQ-16: $M = 9.75$, $SD = 6.39$) was lower ($t(576) = 9.09$, $p < .001$, $d = 0.75$) compared to the representative sample in Reck et al. (2006) and was on par with a subgroup of mothers with postpartum depression. Relationship satisfaction (PFB-K: $M = 18.53$, $SD = 5.22$) was comparable to the norm scores in Kliem et al. (2012), ($t(565) = -.30$, $p = .768$, $d = 0.20$).

In the final hierarchical regression model, perceived stress, relationship satisfaction, and bonding showed an association with the mother's retrospectively assessed burden due to the infant's crying and sleep behavior. The variance of burden due to infant's crying was explained by 20.5% ($F(3,562) = 49.57$, $p < .001$, R^2 adj $= 0.205$) and burden due to infant's sleep behavior by 17.3% ($F(3,562) = 40.26$, $p < .001$, R^2 adj $= 0.173$). Higher burden due to crying as well as sleep behavior corresponded to higher perceived stress as well as lower bonding and lower relationship satisfaction (see table 2.1). Depressive symptoms did not significantly contribute to the explanation of maternal burden due to infant crying and sleeping behavior ($p > .202$). Maternal

Table 2.1: *Predictors of Retrospectively Assessed Maternal Burden due to Infant Behavior: Final Model Information on the Hierarchical Regressions (Method: Backward Elimination).*

Criterion	Predictors	*B*	*S.E.*	β	*t*	*p*	*Partial*
Burden due to crying	Constant	1.302	0.311	/	4.185	< .001	/
	PBQ-16	0.051	0.009	0.224	5.563	< .001	.167
	PFB-K	-0.023	0.011	-0.082	-2.028	.043	-.093
	PSS-10	0.062	0.009	0.285	6.731	< .001	.269
Burden due to sleep behavior	Constant	1.141	0.301	/	3.791	< .001	/
	PBQ-16	0.036	0.009	0.165	4.017	< .001	.194
	PFB-K	-0.024	0.011	-0.092	-2.225	.026	-.070
	PSS-10	0.059	0.009	0.286	6.609	< .001	.175
Burden due to feeding/eating behavior	Constant	1.032	0.254	/	4.065	< .001	/
	PBQ-16	0.035	0.007	0.199	4.689	< .001	.228
	PFB-K	-0.015	0.009	-0.071	-1.663	.097	-.085
	PSS-10	0.032	0.008	0.188	4.220	< .001	.273

Note. B = unstandardized regression weight; *S.E.* = standard error; β = standardized regression weight; t = t-value; p = empirical α-error; PBQ-16 = Postpartum Bonding Questionnaire - short form; PFB-K = Partnership Questionnaire - short form, PSS-10 = Perceived Stress Scale; *Partial* = partial correlation.

variables showed an association with burden due to infant feeding/eating behavior with a variance explanation of 11.8% ($F(3,562) = 26.24$, $p < .001$, R^2 adj = 0.118). Burden was higher along with increased perceived stress and lower bonding (see table 2.1). Maternal depressive symptoms did not significantly contribute to the explanation of maternal burden due to infant eating behaviors ($p > .251$). Overall, the regression models did not appear to be affected by multicollinearity, as the variance inflation of the predictors ranged between $VIF = [1.189; 2.295]$.

Factors Explaining Maternal Burden

MANOVAs (Hotellings T^2) revealed significant multivariate main effects on maternal depressive symptoms and perceived stress as well as relationship characteristics, that is,

maternal bonding and relationship satisfaction, for (1) increased crying and prolonged sleep onset latency ($F(7,552) = 2.52$, $p < .05$, $\eta^2_p = .03$), (2) the presence of a sibling to the infant ($F(7,552) = 6.78$, $p < .001$, $\eta^2_p = .08$), and (3) the age of the last infant ($F(7,522) = 2.59$, $p < .05$, $\eta^2_p = .03$). There was also an interaction between having at least one sibling and age of the infant ($F(7,522) = 3.28$, $p < .01$, $\eta^2_p = .04$).
Univariate post-hoc tests (see table 2.2) showed that firstly, mothers who reported that their infant cried more and was difficult to calm or who reported prolonged sleep onset latency (> 45 minutes) for the time of greatest restrictions ($n = 221$) overall showed higher levels of burden due to crying, sleeping, and feeding/eating behaviors ($F(1,558) \geq 5.77$, $p \leq .017$, $\eta^2_p \geq .01$) than mothers who reported that their infant did not cry more and was not difficult to calm and fell asleep in less than 45 minutes ($n = 345$). The mothers who reported more crying, difficulties in calming or prolonged sleep onset latency showed no significant differences in perceived stress (PSS-10), bonding (PBQ-16), depressive symptoms (EPDS), and relationship satisfaction (PFB-K; $F(1,558) \leq 2.11$, $p \geq .147$). Secondly, mothers in homes with at least one other child showed significantly more stress (PSS-10; $M = 18.51$, $SD = 6.85$), less relationship satisfaction (PFB-K; $M = 17.39$, $SD = 5.21$), as well as more burden due to infant crying ($M = 2.83$, $SD = 1.52$; $F(1,558) \geq 4.84$, $p \leq .028$, $\eta^2_p \geq .09$). Thirdly, the age of the infant was significantly related to bonding (PBQ-16) and maternal burden due to crying and sleep behavior ($F(1,558) \geq 6.25$, $p \leq .013$, $\eta^2_p \geq .01$): The older the infants, the more burdening the crying, ($r(577) = .14$, $p < .01$) and sleeping behavior ($r(577) = .11$, $p < .01$) and at the same time the lower the bonding ($r(577) = .10$, $p < .05$). Finally, the age x sibling interaction showed a significant effect only on the burden due to feeding and eating behavior ($F(1,558) = 6.53$, $p < .05$, $\eta^2_p = .01$). This can be traced back to the fact that the relationship between age and burden due to feeding/eating behavior only was statistically significant in the group of mothers with more than one child living in the household ($r(254) = .14$, $p < .05$), implying that the higher the age of the infant, the higher the burden.

Table 2.2: *Associations (Main Effect) Between Infant Behavioral Problems and Maternal Burden, Perceived Stress, Depressive Symptoms, Bonding, and Relationship Satisfaction – Descriptive Statistics and Post-Hoc ANOVAs.*

	M (SD) (total)	*Comparative value/ cut-off*		*M*	*SD*	*Effect variance*	*F*	*p*	η^2_p
PSS-10	17.65 (6.71)	13.34 (*SD*=6.75)	No behavioral problems[a]	16.44	6.39	88.49	2.1	.147	.004
			Behavioral problems[b]	19.38	6.76				
PBQ-16	9.75 (6.39)	7.33 (*SD*=6.14)	No behavioral problems[a]	8.92	5.87	72.64	1.84	.176	.003
			Behavioral problems[b]	11.19	6.91				
PFB-K	18.54 (5.22)	18.6 (*SD*=4.5)	No behavioral problems[a]	19.01	4.79	39.79	1.54	.176	.003
			Behavioral problems[b]	17.80	5.77				
EPDS	7.53 (5.45)	< 10	No behavioral problems[a]	6.51	5.16	29.72	1.08	.300	.002
			Behavioral problems[b]	8.92	5.40				
Burden due to crying	2.46 (1.45)	–	No behavioral problems[a]	2.19	1.37	10.52	5.77	.017	.010
			Behavioral problems[b]	2.0	1.46				
Burden due to sleep behavior	1.08 (1.34)	–	No behavioral problems[a]	1.74	1.14	26.83	16.57	$< .001$	.029
			Behavioral problems[b]	2.6	1.54				
Burden due to feeding/eating behavior	1.65 (1.12)	–	No behavioral problems[a]	1.51	0.99	8.331	6.87	$< .01$	.012
			Behavioral problems[b]	1.87	1.27				

Note. M (SD) (total) = mean and standard deviation of the whole sample; for references regarding comparative values see Results section; M = mean, SD = standard deviation, effect variance = type III, F = F-standardized effect variance, p = empirical α-error, η^2_p = partial Eta-squared, PSS-10 = Perceived Stress Scale, PBQ-16 = Postpartum Bonding Questionnaire, PFB-K = Partnership Questionnaire - short form, EPDS = Edinburgh Postnatal Depression Scale; [a]$n = 345$, [b]$n = 221$ (mothers reporting increased crying as "severe" or "very severe" and sleep onset latency as more than 45 minutes during the time of greatest restrictions).

2.4 Discussion

2.4.1 Summary and Comparison of Findings

The aim of the present work was to investigate infant behavioral problems in the vulnerable period of the first year of life and the related burden on mothers during the COVID-19 pandemic, as well as to identify additional stressors and protective factors specific to this phase of life.

At the time of the survey, mothers generally reported an increased risk for a depressive episode and increased stress levels. These results add to findings of increased depression levels in the peri- and postpartum period since the onset of the pandemic (e.g., Ceulemans et al., 2021) as well as findings of increased stress levels in the general population (Kowal et al., 2020). For the time of greatest restrictions, nearly one-fifth of mothers reported high levels of burden due to their infant's sleep behaviors.

Overall, prolonged sleep onset latencies and/or increased night awakenings were reported for 21.7% of infants. This is consistent with an Israeli study in which a deterioration of sleep duration and quality was reported by approximately one-third of mothers in their children six months of age and older at the onset of the pandemic (Zreik et al., 2021).

Overall, more than a quarter of the mothers reported a high burden due to infants' crying during the time of greatest restrictions. In comparison to this perceived burden, contrary to our expectation, the prevalence of behavioral problems, as measured by clinical criteria (excessive crying 1.6%), appears to be low.

Feeding and eating problems among the infants played only a minor role in the present study, with a low prevalence of 3.8%.

The multiple regression analyses showed that the subjectively reported maternal burden due to the crying and sleeping behavior of the infants was related to increased stress levels. However, this association was not shown with regard to depressive symptoms. Depressive symptoms might rather be related to other factors (such as chronic burden, previous depressive illness; Reck et al., 2008). As expected, mothers experienced less burden related to positive relationship characteristics (bonding, relationship satisfaction). Stable family relationships are known to be protective factors in the development of postpartum mental health problems (e.g., Reck et al., 2016).

Mothers, who had a sibling to their infant at home, who perceived a lack of medical, psychotherapeutic, or other care, or who reported that their infant cried more or took a long time to fall asleep (> 45 minutes) reported higher levels of burden due to infant behavior. With the infant's age, the burden due to crying, sleeping, feeding, and eating

behavior increased, as did the extent to which bonding was lowered. This finding could be explained by the association of infant crying with maternal tiredness and exhaustion, which has been frequently demonstrated in the past (in particular, through disruptions to the circadian rhythm and less rest overall; Kurth et al., 2011). This may have been exacerbated during pandemic restrictions. Likewise, these findings line up with recent studies on the situation of families in the COVID-19 pandemic, which present increased family "chaos" in daily routines, more hecticness and tension at home (A. D. Johnson et al., 2022, surveyed with the Confusion, Hubbub, and Order Scale; CHAOS, Matheny et al., 1995). This is associated with increasing maternal burden (increased stress, less sleep, and poorer sleep quality) whereby the more children live in the household, especially younger ones, the more family "chaos" (Kracht et al., 2021).Thus, in the context of the risk and resilience model by Prime et al. (2020), increasing infant age (and thus longer-lasting burden), the presence of infants' siblings, as well as reduced access to the care system can be understood as risk factors (the latter specific to the pandemic) for maternal burden and affected parent-infant relationships. Financial losses, job loss, and less contact with friends and colleagues did not seem to have an additional influence on burden.

2.4.2 Limitations

The data were collected exclusively via an online survey. Conditions during the survey could not be controlled (e.g., distraction, differences in presentation on different devices). Furthermore, the maternal level of education which lies above average in our sample does not allow for a generalization of the results.

In addition to standardized measurement instruments, a self-developed questionnaire was used. The reasons for this were that (1) the burden during the time of greatest restrictions at the beginning of the pandemic was to be assessed as well, which was only possible retrospectively, and (2) no pandemic-specific instruments were available. There are no comparative data from an unaffected control group. Furthermore, due to the cross-sectional and quasi-experimental design, no causal conclusions can be drawn from the results. Future studies should be longitudinal, preferably using a cross-lagged panel design, in order to estimate the directions of the effect of the observed associations.

Some of the assessed constructs were similar (e.g., perceived stress and burden due to infant behavior) and part of the explained variance could be due to this. The effect sizes for the correlations in the present study can be classified as small for the most part.

2.4.3 Conclusion

The results of this study indicate that the distress associated with the COVID-19 pandemic represent a risk to maternal mental health during the vulnerable period of the first year of life. The demands of caring for young children and their siblings in particular, as well as a simultaneously experienced lack of medical, psychotherapeutic, or other care, appear to have a compounding effect on maternal burden. A positive mother-infant relationship (maternal bonding) and a good relationship with the partner might alleviate this burden. Pandemic-related prevention approaches should focus on strengthening intra-family relationships, facilitating the access to mother-child-specific health care, and provide support for the care of infants' siblings. Thus, maternal psychological burden may be mitigated in the time of the pandemic. Future studies could reveal the factors through which pandemic-specific psychosocial stressors influence infant regulatory problems (e.g., via maternal stress regulatory competence, adequate co-regulation).

Chapter 3

Study 2: Long-Term Relations Between Maternal Depressive Symptoms and Perceived Stress During the COVID-19 Pandemic: The Role of Maternal Bonding

In this chapter, the longitudinal study 2 is presented, which focused on the exploration of the role of maternal bonding in the relationship between depressive symptoms and perceived stress during the COVID-19 pandemic in mothers of children aged 0-3 years. Mediating effects to investigate if depressive symptoms might convey their effect on perceived stress via lower bonding and moderating effects to investigate if bonding might affect the strength of the long-term association between maternal depressive symptoms and perceived stress were examined.

3.1 Theoretical Background

Maternal bonding is a prominent construct in postpartum mental health research and is described as the particular emotional bond a mother develops towards her infant (Klaus & Kennell, 1976). Lower maternal bonding is associated with more depressive symptoms (see Tichelman et al., 2019, for an overview) and more parenting stress (e.g., de Cock et al., 2017). In the context of postpartum depression, a more stable

maternal bond can act as a protective factor against later parenting stress (Mason et al., 2011; Reck et al., 2016) and fosters infant development (Le Bas et al., 2022; Le Bas et al., 2020). This might be particularly important during the COVID-19 pandemic, where confinement measures have been challenging, especially for families. Parents face numerous additional pandemic-related stressors in their daily family life – for example due to childcare closures – leading to increased caregiver burden and poorer mental health, which in turn might affect parent–child relationship (e.g., Brown et al., 2020; Russell et al., 2020). Parents of young children, especially, reported reduced well-being (Huebener et al., 2021) and mothers in the peripartum period are at a particularly heightened mental health risk (Almeida et al., 2020).

Studies regarding the impact of the pandemic conditions on postpartum maternal bonding – and how it might act as a protective factor in parental mental health and well-being – are rare and show mixed results: Some studies found significantly lower bonding in mothers during early stages of the pandemic compared to pre-pandemic samples (e.g., Suzuki, 2022, in Japan) or subsamples (D. V. Fernandes et al., 2021a, in Portugal). In both of these non-clinical samples, depressive symptoms were not increased. In contrast, Canadian mothers seeking treatment during the pandemic showed more severe postpartum depression compared to a pre-pandemic sample, yet no lower maternal bonding (Layton et al., 2021). Overall, two meta-analyses reported heightened rates of clinically elevated depressive symptoms in postpartum mothers between 26.9% and 28% (Racine et al., 2022; Safi-Keykaleh et al., 2022). Also, maternal perceived stress seemed to be increased during the pandemic (Suárez-Rico et al., 2021).

The current study focused on the influence of maternal bonding on the relationship between depressive symptoms and perceived stress in the course of the COVID-19 pandemic in mothers of children aged 0-3 years. As we were interested in long-term changes, a cross-lagged panel model (CLPM – a form of structural equation model exploring reciprocal relationships across time) served as the basis for evaluating our hypotheses. Thus far, findings about how the trajectories of perceived stress and depressive symptoms interact are inconclusive; the relationship between the two variables is argued to be reciprocal (Hammen, 2005). Longitudinal studies on perceived stress and postpartum depressive symptoms (e.g., Chow et al., 2019; Law et al., 2019) indicate a robust relationship between the two constructs and no clear direction of the effects across the first years of motherhood. This is supported by a first analysis of the sample of this current study, where depressive symptoms and perceived stress predicted themselves longitudinally and were strongly intercorrelated (Woll, 2022). Both increased over time, which could be explained with more severe pandemic restrictions during the second assessment phase. To the best of the authors' knowledge, regarding

postpartum depressive symptoms, perceived stress, or bonding, no study conducted during the pandemic (e.g., D. V. Fernandes et al., 2021b; J. Fernandes et al., 2022; Gluska et al., 2022) addressed all three variables at once so far. In D. V. Fernandes et al. (2021b), depressive symptoms and bonding improved after two months (bonding improved only when depression was not controlled for); the authors assumed that this was partially caused by lockdown measures having been lifted for the first time. Several studies point to additional negative effects of lockdown phases on maternal mental health (e.g., J. Fernandes et al., 2022; Gordon-Hacker et al., 2022), which may impact maternal bonding as well.

As depressive symptoms and stress increased in the current sample (Woll, 2022), and because of the known negative relationship between postpartum maternal bonding and depressive symptoms (Tichelman et al., 2019), we presumed bonding quality would worsen over the course of the pandemic. Our central aim was to examine the particular influence of bonding on the relationship of depressive symptoms and stress. While Reck et al. (2016) found that bonding partially mediated the effect of postpartum depression on maternal *parenting stress* in both cross-sectional and longitudinal analysis, *stress in general* is a different construct, as it captures more overall stressful experiences rather than primarily child-related ones. Hence, we explored both mediating and moderating effects, assuming that either depressive symptoms might convey their effect on perceived stress via lower bonding (mediation) or that bonding might affect the strength of the long-term effect of maternal depressive symptoms on perceived stress (moderation).

3.2 Method

3.2.1 Sampling Procedures and Participants

The CoviFam survey is an online longitudinal assessment on the psychosocial well-being of parents of infants and toddlers and of their children's behavioral problems during the COVID-19 pandemic in German-speaking countries (Germany, Austria, and Switzerland). Parents of children aged 0-3 years were recruited via medical institutions (e.g., pediatric and gynecological practices, birth clinics) and professional networks (e.g., German Midwifery Association) but mostly via various social media (e.g., Instagram, Twitter, Facebook). The organizational aspects of the study were conducted in Munich and Heidelberg.

Parents could participate completely anonymously or provide an email address at the

first time point (T1) to be contacted for follow-up (T2). For our main analyses, only mothers from Germany were included. The sample comprised of 666 mothers, who had participated both at T1 (mid-July until mid-November 2020; few pandemic-specific restrictions) and T2 (mid-February until mid-March 2021; more pandemic-specific restrictions), see table 3.1 for sociodemographic information. Seventy-one children were above 3, six of them slightly above 4 years of age. As the focus lies on the dynamics of maternal outcomes and not on any child-specific outcomes, we decided not to exclude these mothers. Moreover, the longitudinal sample of 666 mothers did not differ significantly from those only completing the survey at T1 ($n = 987$) on any sociodemographic or outcome variable, except for maternal age and change in partner's job situation (for more details see supplementary information 1).

3.2.2 Measures

To assess parents' pandemic-related experiences, we used a self-developed questionnaire (Reck et al., 2020), with items on various domains, such as socioeconomic status, educational background, housing situation, and childcare during the pandemic. Parents were asked to answer with their youngest child in mind. Additionally, the following three standardized questionnaires were administered (see table 3.2 for reliability values).

Postpartum Bonding Questionnaire (PBQ-16)

The German version of the Postpartum Bonding Questionnaire with 16 items (PBQ-16; Reck et al., 2006), answered on a 6-point-Likert scale ranging from 0 ("always") to 5 ("never"), was used to assess bonding quality in our sample. The PBQ-16 is based on the original 25-item English version by Brockington et al. (2001). Parents state the frequency of particular emotions, feelings and sensations regarding their interaction and relationship with their baby. A higher sum score shows more impaired bonding, hence lower maternal bonding quality.

Edinburgh Postnatal Depression Scale (EPDS)

Depressive symptoms were measured by the German version (Bergant et al., 1998) of the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987), which has been validated for the detection of peripartum depression in numerous studies (Matthey et al., 2006). Participants rate ten questions about their last seven days on a 4-point Likert scale, coded from 0 to 3. A higher sum score indicates a higher severity of depressive symptoms.

Table 3.1: *Sociodemographic Characteristics of the Study Population.*

	n	%	*M*	*SD*
Mothers' age (in years)	648		33.45 [19, 47]	4.26
Child's age (in months)	663		20.37 [0.3, 50.57]	11.27
Child's gender	666			
Female	326	48.95		
Male	340	51.05		
Relationship status of parents	666			
Married (living together)	512	76.87		
Relationship (living together)	125	20.27		
Relationship (not living together)	4	0.60		
Single	7	1.05		
Divorced	7	1.05		
Widowed	1	0.15		
Education	666			
Left school without diploma	1	0.15		
German middle school diploma	5	0.75		
German Realschule diploma	67	10.36		
German Fachabitur	76	11.41		
German Abitur	515	77.33		
Household monthly net income	663			
0 - 1000 €	8	1.20		
1000 - 2000 €	44	6.64		
2000 - 3000 €	141	21.27		
3000 - 5000 €	318	47.96		
> 5000 €	152	22.93		
Change in job situation	666			
No change	356	53.45		
Short-time working*	20	3.00		
Home office	160	24.02		
Had to stay home and could not work	40	6.00		
Other changes	90	13.51		
Number of children in the household	663		1.6 [1, 6]	0.81

Note. All results were calculated based on participant reports from the first time point. Participants with children in the fourth year of life were not excluded for this calculation.
*Kurzarbeit is a German social insurance program whereby employers reduce their employees' working hours (usually to 60%) instead of laying them off.

Table 3.2: *Robust Reliability Values, Cronbach's Alpha (α) and McDonald's Omega (ω), Regarding PBQ-16, EPDS, and PSS-10 at Both Time Points.*

Instrument	T1		T2	
	α	ω	α	ω
PBQ-16	.83	.84	.87	.87
EPDS	.86	.87	.87	.87
PSS-10	.90	.91	.91	.91

Note. $N_{T1\&T2} = 666$. α and ω are used to represent Cronbach's alpha and McDonald's omega, respectively. All values calculated via the "coefficientalpha" package in R. EPDS = Edinburgh Postnatal Depression Scale, PSS-10 = Perceived Stress Scale, PBQ-16 = Postpartum Bonding Questionnaire.

Perceived Stress Scale (PSS-10)

The German version of the Perceived Stress Scale (PSS-10; Reis et al., 2019), assesses self-reported stress levels – from an individual's view of their own coping skills. The instrument contains 10 items, and is answered on a 5-point Likert scale coded from 0 to 4 ("never" to "very often"). Higher sum scores show higher stress levels.

3.2.3 Statistical Analysis

All analyses were run using R and RStudio (R Core Team, 2022; RStudio Team, 2022). Specifically, structural equation modelling (SEM) in the form of CLPMs was applied in R, using the packages "lavaan" (Rosseel, 2012), "semPlot" (Epskamp et al., 2022), and "dplyr" (Wickham et al., 2021). Maximum-likelihood estimation with robust estimators of model fit (MLR), with robust (Huber-White) standard errors, and a scaled test statistic that is (asymptotically) equal to test statistic by L.-t. Hu & Bentler (1999) were used to obtain parameter estimates. To compensate for missing data, a full-information maximum-likelihood approach was employed. A range of fit indices was examined to evaluate the quality of model fits, including the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). In line with L.-t. Hu & Bentler (1999) and Kline (2016), cut-off values for good model fit were CFI $>$ .90, TLI $>$ .90, SRMR $<$ .09, and RMSEA $<$ .08. Cut-offs for excellent model fit were CFI $>$ .95, TLI $>$ .95, SRMR $<$ .08, and RMSEA $<$ .06.

To examine the dynamic relationship between maternal depressive symptoms, perceived stress, and bonding at T1 and T2, an initial CLPM was calculated, which informed the structural design between the variables in the main CLPM analysis. We also conducted exploratory CLPMs regarding relevant control variables (e.g., child's and mother's age). The results of the initial CLPM (see supplementary figure 1 and supplementary table 2) suggested a reciprocal relationship between depressive symptoms and perceived stress and a likely mediating and/or moderating effect of bonding between the other two: Despite being a significant predictor of both depressive symptoms and perceived stress, bonding at T2 was not significantly regressed upon by them. Therefore, in the main CLPM, cross-lagged effects to calculate unidirectional and/or bidirectional relations among depressive symptoms, perceived stress and bonding were modeled (Selig & Little, 2012), by using bonding as a mediator. In addition, classical mediation analysis was undertaken (Hayes, 2022). Finally, we calculated a moderation model with bonding at T1 moderating the long-term effect of maternal depressive symptoms at T1 on perceived stress at T2.

3.3 Results

The means, standard deviations and correlations for PBQ-16, EPDS, and PSS-10 at both time points are shown in table 3.3. See Woll (2022) for results regarding depressive symptoms and perceived stress, where both worsened significantly, with moderate effect sizes. Bonding significantly deteriorated from T1 to T2, $t(665) = 9.67$, $p < .001$, with a small effect ($d = 0.27$). The three variables were significantly inter-correlated, within both time points. While some demographic and pandemic-related variables were related significantly to depressive symptoms, perceived stress, or bonding (i.e., child age, number of children in the household, household income, change in job situation, relationship status, and education level, see supplementary table 1), none had a large enough influence to account for the variance in the data. Hence, our main CLPM included depressive symptoms, perceived stress, and bonding, with bonding at T1 used as a mediator (see figure 3.1). Bonding at T2 was added to control for measurement invariance and account for covariance between outcome variables.

The mediated CLPM provided an excellent fit to the data, $\chi^2(2) = 5.706$, $p = 0.058$, CFI = 0.998, TLI = 0.986, RMSEA = 0.060 [NA, 0.121], SRMR = 0.022. The standardized path coefficients (figure 3.1; see table 3.4 for standard errors) revealed strong evidence of cross-lagged and reciprocal predictions between depressive symptoms and perceived stress and a mediation effect.

Table 3.3: *Descriptive Statistics and Correlations of Maternal Depressive Symptoms, Perceived Stress, and Bonding at Both Time Points.*

Variable	*M*	*SD*	1	2	3	4	5
1. Depressive symptoms T1	7.73	5.51					
2. Depressive symptoms T2	10.51	5.80	.62**				
			[.57, .67]				
3. Perceived stress T1	18.21	7.23	.77**	.56**			
			[.74, .80]	[.51, .61]			
4. Perceived stress T2	21.32	7.27	.55**	.80**	.61**		
			[.50, .60]	[.77, .82]	[.56, .65]		
5. Bonding T1	12.30	7.20	.46**	.36**	.42**	.35**	
			[.40, .52]	[.30, .43]	[.36, .48]	[.28, .41]	
6. Bonding T2	14.36	8.17	.41**	.48**	.37**	.49**	.75**
			[.34, .47]	[.42, .53]	[.31, .44]	[.43, .54]	[.72, .78]

Note. Pearson correlations. Squared brackets include the 95% confidence intervals. Bonding scores and bonding quality are inversely related, meaning that higher values on the PBQ-16 represent lower bonding.
*$p < .05$, **$p < .01$

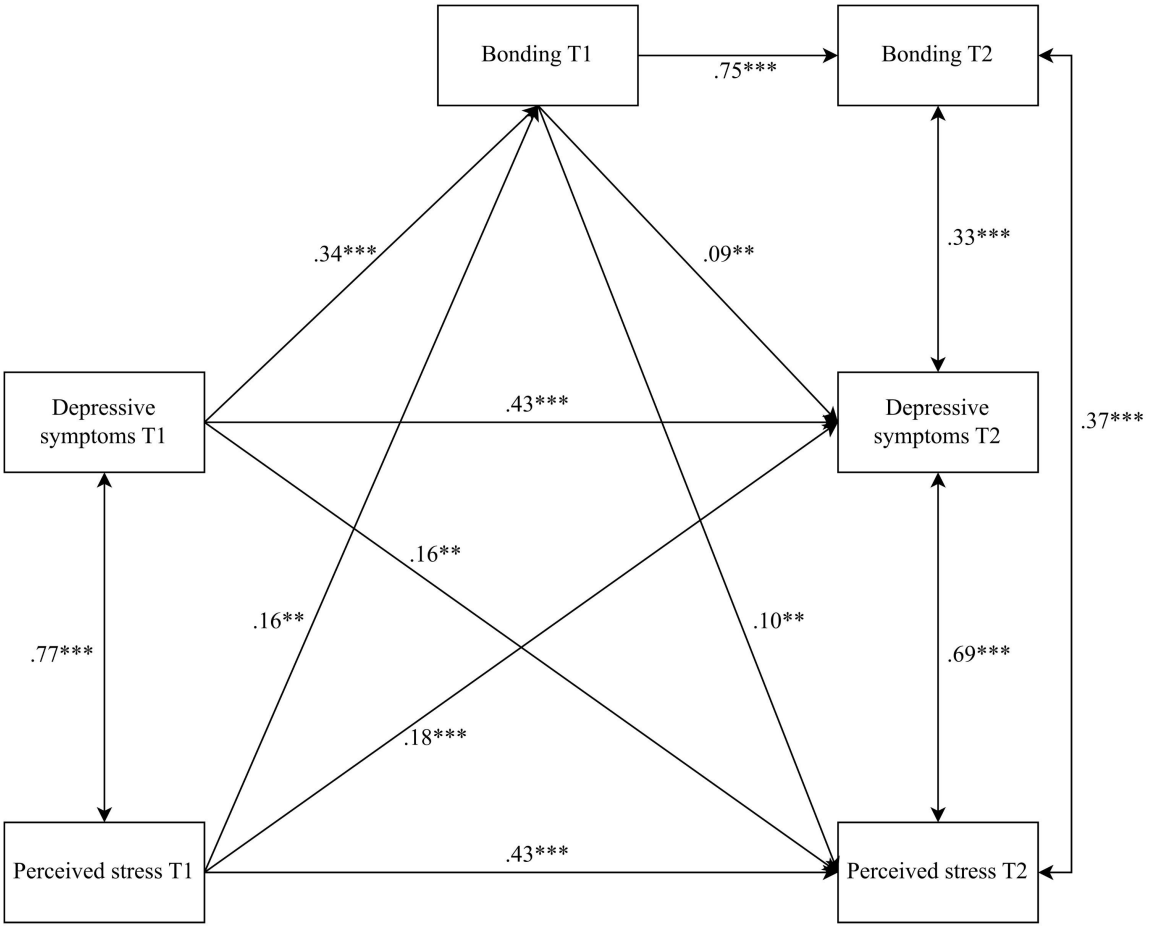

Figure 3.1: Pathways and beta coefficients of the cross-lagged panel model with mediation. Double-headed arrows represent Pearson correlations. Single-headed arrows represent predictive regression paths and are depicted as standardized beta coefficients. $N = 666$. Bonding scores and bonding quality are inversely related, meaning that higher values on the bonding scale, that is, PBQ-16, represent lower bonding.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 3.4: *Standardized Path Coefficients in the Mediated Cross-Lagged Panel Model Analysis With Perceived Stress, Depressive Symptoms, and Bonding.*

Variable	β Path Coefficients	*SE*
Perceived stress T2		
Perceived stress T1	.43***	0.05
Depressive symptoms T1	.16**	0.06
Bonding T1	.10**	0.03
Depressive symptoms T2		
Depressive symptoms T1	.43***	0.05
Perceived stress T1	.18***	0.04
Bonding T1	.09**	0.03
Bonding T2		
Bonding T1	.75***	0.04
Bonding T1		
Depressive symptoms T1	.34***	0.08
Perceived stress T1	.16**	0.05

Note. β represents standardized beta-weights and *SE* represents standard error. The covariance values (excluded here for clarity) were all significant and moderate in size. Bonding scores and bonding quality are inversely related, meaning that higher values on the bonding scale, that is, PBQ-16, represent lower bonding.
*$p < .05$, **$p < .01$, ***$p < .001$

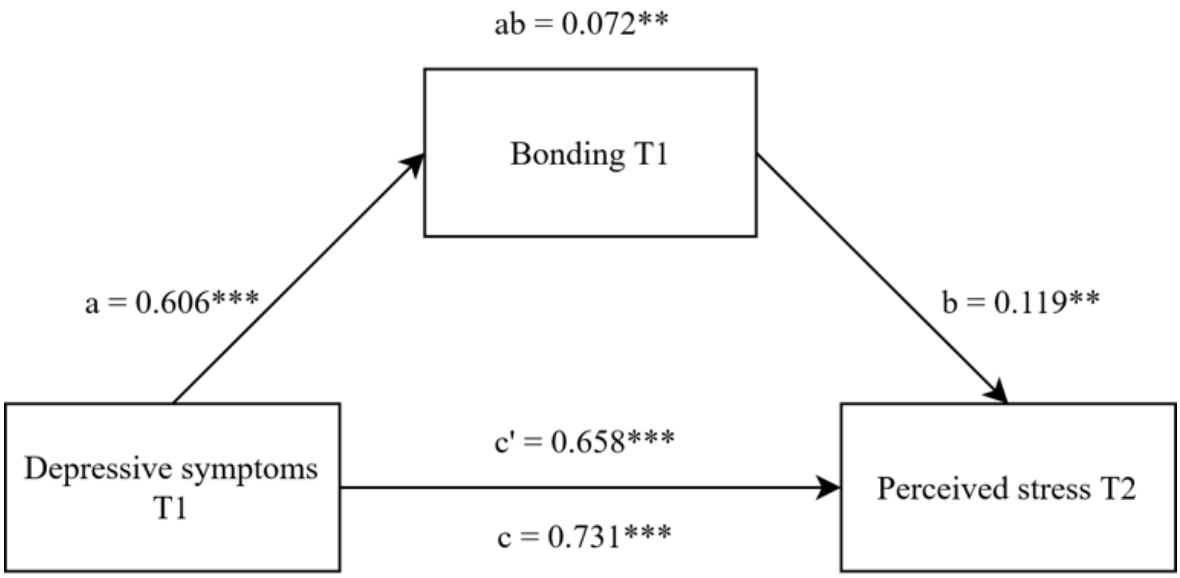

Figure 3.2: Mediation model demonstrating the relation between depressive symptoms at T1 and perceived stress at T2, as mediated by bonding at T1. ab represents the magnitude of the mediated (indirect) effect, while c represents the total effect, and c' the direct effect. The significance of the indirect effect was tested using bootstrapping procedures in R. Bonding scores and bonding quality are inversely related, meaning that higher values on the bonding scale, that is, PBQ-16, represent lower bonding.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Accordingly, there was a distinct structural indication of maternal depressive symptoms and perceived stress regressing on and predicting each other, when bonding mediated their relationship. The isolated mediation model to corroborate the CLPM results revealed a partial mediation (ab = 0.07, $p < .01$, c' = 0.66, $p < .001$; see figure 3.2), that is, as all paths were significant, only partial mediation could be deduced.
In addition, a moderation analysis was executed; the regression coefficient for the interaction term of depressive symptoms and bonding was small, but significant (ΔR^2 = .32, $\Delta F(3, 662) = 105.6$, $p < .001$, b = -.012, $t(662)$ = -2.45, p = .015). Thus, a significant moderation effect was seen: bonding at T1 moderated the effect of depressive symptoms at T1 on perceived stress at T2.

3.4 Discussion

3.4.1 Summary and Comparison of Findings

The main aim of the presented work was to investigate the role of maternal bonding in the long-term relation between maternal depressive symptoms and perceived stress

during the COVID-19 pandemic. Studies with non-clinical samples showed lower postpartum bonding compared to before the pandemic (D. V. Fernandes et al., 2021a; Suzuki, 2022). In our longitudinal design with 666 mothers of infants and toddlers, bonding quality did not only decrease from the first to the second measurement point (M_1 = 12.30, SD_1 = 7.20 compared to M_2 = 14.36, SD_2 = 8.17; with higher means representing lower bonding quality), but was low to begin with compared to values in a pre-COVID-19 sample of clinically depressed (M = 9.77, SD = 6.96) and healthy mothers (M = 7.33, SD = 6.14), as reported by Reck et al. (2006). Additionally, levels of depressive symptoms and perceived stress were high and increased during the assessment period. This might be explained with more severe pandemic restrictions at T2 (see Woll, 2022). Elevated levels of depressive symptoms during the pandemic are in line with other studies (e.g., Racine et al., 2022; Safi-Keykaleh et al., 2022), and some studies also reported elevated stress levels (e.g., Suárez-Rico et al., 2021). In an international online survey, Ceulemans et al. (2021) found higher stress levels and depression rates in breastfeeding women in those countries with then more strict containment measures.

In line with general research on depression and stress (e.g., Hammen, 2005), the assessment of the relationship of maternal depressive symptoms, perceived stress, and bonding during the course of the pandemic showed significant reciprocal predictions between depressive symptoms and perceived stress. Focusing on the role of bonding, the CLPMs in this study suggested and corroborated bonding as a mediator. Separate mediation and moderation models revealed both a small partially mediating and a small moderating effect of bonding. This suggests that part of the long-term negative effect of mothers' depressive symptoms on perceived stress was transmitted via lower bonding. Independently, bonding was shown in the moderation analysis to be meaningful with regard to the fact that the higher the impairment of bonding, the weaker the relationship between depressive symptoms and perceived stress. It could be assumed in this case that mothers with higher bonding and at the same time more depressive symptoms suffer from worries about their depressive symptoms affecting their mother-child-relationship and therefore also show more symptoms of perceived stress in the long-term. Since a positive association between bonding and perceived stress could be shown in this sample, it can nevertheless be assumed that higher bonding might act as a protective factor regarding maternal well-being during the pandemic.

To check for possibly relevant control variables, additional CLPMs were run with sociodemographic and pandemic-related variables, but the coefficients were so small that they were not included in the main analysis. However, some of these variables had shown significant bivariate correlations with our variables of interest (e.g., number of

children).

3.4.2 Limitations

So far, low postpartum bonding has been revealed to predict later parenting stress in population-based samples of mothers (de Cock et al., 2017) and in clinically depressed mothers (Mason et al., 2011; Reck et al., 2016). General perceived stress has been researched less often, but was found to be associated with bonding in mothers 1-3 days postpartum (Lutkiewicz et al., 2020). This study focused on perceived stress because a more general concept of stress seemed appropriate to consider the impact of pandemic-related stressors on individuals. As far as we know, this is the first study to investigate the role of maternal bonding in the already established relationship between depressive symptoms and perceived stress (e.g., Chow et al., 2019), with cross-lagged panel modeling. While we consider the use of CLPMs as a strength, this method has its limitations when analyzing only two measurement points and thus not allowing for a distinction between within- and between-person effects (Lucas, 2022). We may overcome this limitation only as soon as our data of a third measurement point will be available. Another limitation is the apparently high level of education and income of our predominantly married sample, which limits generalizability to less well-off and/or single mothers. More importantly, we cannot say if the results achieved in self-report in an anonymous online survey generalize to samples assessed with clinician-rated criteria, or to clinical samples in particular. However, both EPDS and PBQ are valid instruments common in postpartum research and our sample showed a broad range of symptom severity, with more than a quarter (28%) reporting a clinically relevant number of depressive symptoms at both measurement points (see Woll, 2022). That said, comparing the results of this study with other postpartum research presents difficulties because the variables, especially bonding, are often collected up to 6 months postpartum while we assessed mothers with children up to three years (in some cases more). Finally, the coefficients for partial mediation and moderation were small. Hence, bonding is very probably only one in a range of relevant predictors which need further investigation. Future research should investigate the role of bonding, also with regard to a possible protective function. Another link in this chain might be maternal self-efficacy. Higher levels of self-efficacy were not only found to be linked to higher bonding in mothers up to 6 months postpartum (Liu et al., 2021) but also to less parenting stress, mitigating pandemic-related stress as well as the influence of depressive symptoms (Lin et al., 2022).

3.4.3 Conclusion

This study shows that mental health and well-being of mothers with infants and toddlers deteriorated during the pandemic, and that bonding influenced these dynamics. In light of the general relevance of maternal bonding for infant development (Le Bas et al., 2020), it makes sense to target – among other variables – maternal bonding as a preventive measure to foster the well-being of mothers at risk for depression, as this might help both mother and child in the long run. While bonding is seldom used as an outcome variable in intervention research, there is a range of programs that seek to improve mother-infant interaction or maternal sensitivity. In particular, video feedback approaches have proven valuable to target dysfunctional interactive patterns in the mother-child relationship (Downing et al., 2014; O'Hara et al., 2019; Reck et al., 2022), which are associated to infant stress reactivity (Müller et al., 2015).

Chapter 4

Study 3: Paternal Mental Health and Bonding During the COVID-19 Pandemic: A Two-Wave Survey

The in the following described study 3 had the aim to assess the condition of fathers of infants and toddlers (0-3 years) during the COVID-19 pandemic. For this purpose, paternal perceived stress, depressive symptoms and bonding quality were examined cross-sectionally and longitudinally. Furthermore, gender differences concerning these variables between the fathers and the mothers within a couple were also investigated.

4.1 Theoretical Background

The COVID-19 pandemic and the associated disruptions to everyday social life resulting from social distancing were especially challenging for families and their daily lives. Daycares and schools were closed, and many parents had to work remotely from home while taking care of their children (Garbe et al., 2020). We are currently only beginning to understand the consequences lockdown phases had on mental health of parents and children. First studies indicated that caregiver or family well-being may have deteriorated and that parenting stress increased (Hiraoka & Tomoda, 2020; Prime et al., 2020). Further findings suggest that the rate of maternal depressive symptoms increased during the pandemic (Davenport et al., 2020; Fallon et al., 2021).
However, a closer look at the research on mental health of parents during the pandemic reveals that mostly mothers are focused on, while little attention is paid to the situation fathers have been in. A few studies suggest that also paternal well-being has been

affected. Although Bıkmazer et al. (2021) and Chung et al. (2020) reported that mothers are more strained during the COVID-19 pandemic than fathers, Taubman-Ben-Ari et al. (2021) reported a higher degree of experienced parenting stress in fathers during the pandemic. Further, rare findings of pandemic related effects on paternal bonding and the father-child relationship are inconclusive (Andrews et al., 2022; J. Hu et al., 2022; Weissbourd et al., 2020).

Paternal psychological well-being and bonding quality before the pandemic

Becoming a parent is considered a *critical life event* that is accompanied by parenting stress for both mothers and fathers (Epifanio et al., 2015). Previous literature draws an inconsistent picture of the differences regarding stress between mothers and fathers. On the one hand, studies showed no gender differences between the stress of new mothers and fathers (within the first 6 months; Gao et al., 2009; Mao et al., 2011; Seah & Morawska, 2016). On the other hand, other studies reported an increased stress level in mothers compared to fathers (Hildingsson & Thomas, 2014; Pancer et al., 2000; Wang & Chen, 2006). Also Matvienko-Sikar et al. (2018) found a higher degree of parenting stress in mothers. Further, their results suggest that for fathers, their health status and attachment quality regarding the child (bonding) are negative predictors for parenting stress.

Rates for paternal postpartum at-risk depression were reported at 7.8% (Gawlik et al., 2013) or 8.7% (Kerstis et al., 2012), using the cut-off value of 10 or more of the EPDS to measure postpartum depressive symptoms. They are lower than the mothers' rates, which range from 16.5% to 23.6% (Kerstis et al., 2012; Reck et al., 2008; von Ballestrem et al., 2005). Whereas it's more common for mothers to experience depressive symptoms shortly after the birth of their child (von Ballestrem et al., 2005), fathers are most likely to develop depressive symptoms when their child is 3-6 months of age (Paulson & Bazemore, 2010). The likelihood of developing postpartum depression as a father increases if there were past depressive episodes, prepartum depressive (and anxiety) symptoms, or if the mother within the couple experienced prepartum depressive symptoms (Ramchandani et al., 2008).

Bonding has been described as the emotional connection between the child and the mother (Klaus & Kennell, 1976) and has long been studied almost exclusively in mothers (Scism & Cobb, 2017). In their integrative review, Scism & Cobb (2017) described the historical development of bonding and mentioned that it was not until around the beginning of the 1980s that father-infant bonding became the subject of scientific investigation and was studied in terms of its relevance in the postpartum period,

(see e.g., Tudiver, 1981). In a Swedish study, Johansson (2011) described fatherhood as being in transition to "the new ideal and image of the caring and present father" (Johansson, 2011, p. 1). Despite this development, research focus still remains primarily on maternal bonding (for an overview, see Bicking Kinsey & Hupcey, 2013) and "more research is needed to examine effective bonding interventions for fathers in the immediate postpartum period, and in doing so, we may begin to appreciate the importance of their roles" (Scism & Cobb, 2017, p. 6). It has been shown that different kinds of early father involvement can have a positive impact on the child's cognitive development (Bronte-Tinkew et al., 2008). Inversely, impaired quality of father-child interaction has been shown to be positively related to child externalizing behavioral problems (Ramchandani et al., 2013). Furthermore, through parenting stress, executive functioning problems in children can be mitigated by higher parental bonding (de Cock et al., 2017).

Paternal psychological well-being and bonding quality during the pandemic

Regarding the well-being of parents during the COVID-19 pandemic, there are few studies examining paternal stress levels. Ben-Yaakov & Taubman-Ben-Ari (2021) found that fathers of children aged 7-12 months, in comparison to children aged 1-6 months, experienced more parenting stress than mothers during the COVID-19 pandemic. Fathers stated more parenting stress when they lived in an area severely affected by COVID-19 (Trumello et al., 2021), or – regarding expectant fathers and fathers at six months postpartum (8.50%) – more perceived stress when they were affected by a strict lockdown compared to expectant fathers and fathers who were not in a lockdown (Tavares et al., 2021). Aguiar et al. (2021) compared burnout symptomatology in fathers and mothers before and during the lockdown in Portugal. They showed that mothers' burn-out rate and exhaustion were overall higher than the father's, but quite stable during the pandemic, while the father's burn-out rate and exhaustion increased dramatically. Taubman-Ben-Ari et al. (2021) also pointed to an increase in parenting stress among Israeli fathers during the pandemic, which is higher than that of mothers exclusively during the pandemic, again emphasizing the need to investigate fathers.

There were findings that parental depressive symptoms increased during the pandemic (Syed et al., 2022; Zou et al., 2022). On the other hand, van den Heuvel et al. (2022), reported lower paternal depressive symptoms compared to before the pandemic (but higher for mothers). The aforementioned mixed method study by Tavares et al. (2021) reported that women (in pregnancy up to 6 months postpartum) had more depressive symptoms than their male partners during the pandemic. Mothers and fathers did

not differ in perceived stress and anxiety. In addition, in the Bıkmazer et al. (2021) study mentioned above, Turkish mothers reported feeling more distressed – including symptoms of depression – than fathers under the burdens of the pandemic related stressors. Brym et al. (2022) also reported more depressive symptoms for mothers than fathers, Cheung et al. (2022) found no gender differences, and Russell et al. (2020) more burden for fathers, including depressive symptoms.

Research on the impact of the COVID-19 pandemic on father-child relationship is still rare (Trumello et al., 2021). In a study by J. Hu et al. (2022) fathers (more than mothers) of preschool children reported an improvement in their relationship to their child. Similarly, Weissbourd et al. (2020) indicated an improvement of their relationship with their children for 68% of fathers because they felt closer to them. In contrast, an impaired initial father-baby bonding due to partner exclusion from maternity care (e.g., exclusion from ultrasound scan) was reported by a qualitative interview study investigating the experiences of fathers whose baby was born during the pandemic in the UK (Andrews et al., 2022).

In sum, initial findings show that psychological well-being of fathers and their relationship to their child was affected by the pandemic. However, due to the lack of studies in this field addressing fathers, we have no clear understanding of the nature of such effects yet. Moreover, psychopathological change of fathers during COVID-19 has been largely addressed using cross-sectional study designs so far. To close this research gap, we examined the situation of fathers of infants and toddlers (aged 0-3 years) during the COVID-19 pandemic with a specific focus on perceived stress, depressive symptoms and bonding to their child. In the present study, we investigated the situation of fathers, both cross-sectionally and longitudinally. Further, we compared their situation with that of mothers (within couples).

Until now, there are only a few studies which examined the impact of the COVID-19 pandemic on paternal psychological well-being longitudinally, but with different criteria regarding the children's age and a majority of participants being mothers. For example, Adams et al. (2021) described an overall increase of perceived stress compared to the pre-pandemic situation, and a decrease during the course of the pandemic. Further, parenting stress was estimated higher compared to before the pandemic by most parents. For more than a half of the sample, parenting stress also increased during the pandemic. M. S. Johnson et al. (2021) showed that parental stress and psychological well-being improved when pandemic-related restrictions became less. Essler et al. (2021) found this pattern regarding parental stress and emotional well-being of the children, while family well-being and parent-child-relationship worsened. In their baseline survey (8 weeks at the beginning of the pandemic), Daks et al. (2022) at-

tributed the decrease of for example parental depressive symptoms and *family chaos* to an adaptation to the new situation. In another longitudinal survey, fathers showed higher levels of depressive symptoms than mothers (49.4% of the sample were fathers; Russell et al., 2021). The present longitudinal study fills a gap in research by examining the well-being and bonding quality of fathers, over the course of the pandemic at two time points: at a time, when regulations were loosened (T1) and during a wave of rising COVID-19 infections, when regulations to fight the pandemic were strict again (T2).

As there are sparse, inconclusive, or incomplete findings regarding the well-being and bonding quality of fathers of infants and toddlers and the respective comparison between mothers and fathers during the pandemic, an exploratory approach was chosen for the current study. Specifically, we examined if there is a change in paternal perceived stress, depressive symptoms and bonding compared to before the pandemic. Furthermore, we investigated gender differences between the fathers and the mothers within a couple. Finally, paternal stress, depressive symptoms and bonding are examined in their development from T1 to T2.

4.2 Method

4.2.1 Sampling Procedures and Participants

The CoviFam study was conducted as an online longitudinal survey in German-speaking countries (Germany, Austria and Switzerland). Parents of infants and toddlers (0-3 years) were surveyed regarding their psychosocial well-being and potential behavioral problems of their children during the COVID-19 pandemic. Organizational study sites were Munich and Heidelberg. The majority of participants were invited to the study via social media such as Instagram, Twitter or Facebook. Further recruitment channels were medical institutions and networks (national and regional) including obstetric clinics, midwives and pediatricians' practices.

Study participation was anonymous. However, parents were invited to provide their email address if they were interested in taking part in subsequent data collection. The sample examined here consists of a subgroup of $N = 173$ fathers currently living in Germany, tested at T1 (mid-July until mid-November 2020; few pandemic-specific restrictions). For a subsample of $n = 97$ living in heterosexual couples, we were able to obtain data also from their female partner. At T2 (mid-February until mid-March 2021; more pandemic-specific restrictions), $n = 55$ of the fathers who participated at

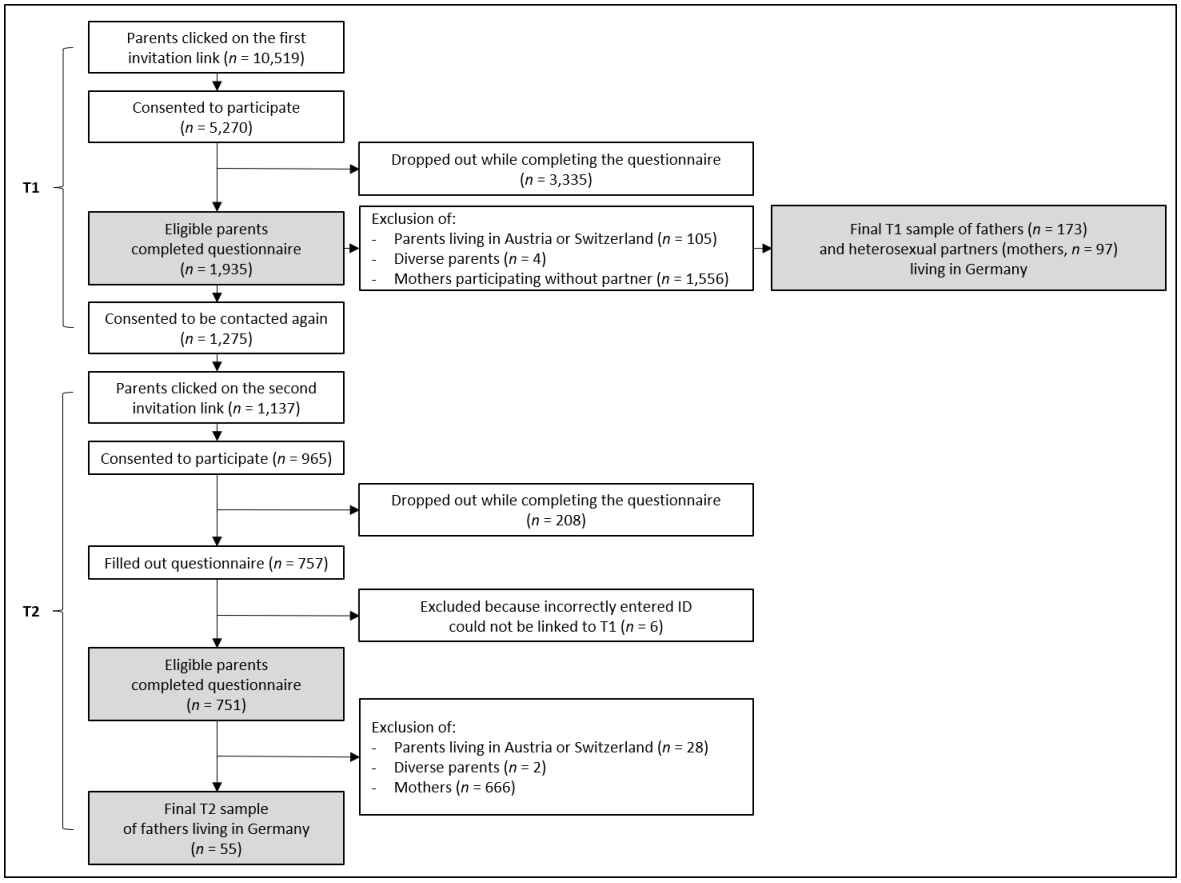

Figure 4.1: Flow chart of participant selection of the CoviFam online survey at measurement time point 1 and 2 (T1 and T2).

T1 filled the follow-up online survey. Figure 4.1 shows sample size details in the course of the data cleaning process. Table 4.1 and 4.2 present detailed sample characteristics. The ratio of child gender was balanced in our sample: There were $n = 88$ (50.9%) male and $n = 85$ (49.1%) female children.

A total of $n = 18$ children were over 3 years of age. Because the emphasis here is on the dynamics of paternal outcomes rather than child-specific outcomes, we did not exclude the fathers of these children.

4.2.2 Measures

A self-developed questionnaire was used to survey parents' daily life with their children during the COVID-19 pandemic (Reck et al., 2020). Parents were asked to report on the youngest child in the household. The questionnaire spanned different topics, such as socioeconomic information, educational background, housing situation or childcare. To assess the situation during the greatest pandemic restrictions of the first COVID-

Table 4.1: *Parametric Descriptive Sample Characteristics.*

Variable	*n*	*Min*	*Max*	*M*	*S.E.*	*SD*
Paternal age (years)	166	24.98	58.40	36.17	0.44	5.72
Maternal age (years)	96	25.27	40.72	33.11	0.34	3.34
Gestation age at birth (weeks)	142	21.00	44.00	39.24	0.23	2.76
Child age (years)	168	0.10	4.20	1.59	0.07	0.92
Paternal care (%)	173	0.00	100.00	41.47	1.94	25.51
Maternal care (%)	97	0.00	100.00	70.51	2.45	24.09
Paternal EPDS (T1)	173	0.00	27.00	5.58	0.40	5.26
Maternal EPDS (T1)	97	0.00	21.00	8.15	0.55	5.44
Paternal PSS-10 (T1)	169	0.00	37.00	15.47	0.57	7.39
Maternal PSS-10 (T1)	97	2.00	36.00	18.46	0.74	7.29
Paternal PBQ-16 (T1)	173	0.00	43.00	11.17	0.55	7.22
Maternal PBQ-16 (T1)	97	1.00	33.00	11.52	0.69	6.84
Paternal EPDS (T2)	55	0.00	27.00	7.35	0.73	5.38
Paternal PSS-10 (T2)	55	5.00	39.00	17.67	1.00	7.43
Paternal PBQ-16 (T2)	55	2.00	32.00	14.91	0.99	7.31

Note. n = size of subsample; *Min* = minimum; *Max* = maximum; M = arithmetic mean; *S.E.* = standard error of arithmetic mean; *SD* = standard deviation. EPDS = Edinburgh Postnatal Depression Scale, PSS-10 = Perceived Stress Scale, PBQ-16 = Postpartum Bonding Questionnaire.

Table 4.2: *Non-Parametric Descriptive Sample Characteristics.*

Paternal education	*f*	$\%_{\text{valid}}$	Maternal education	*f*	$\%_{\text{valid}}$
No school leaving qualification	1	0.58	No school leaving qualification	0	0.00
Low secondary qualification	5	2.89	Low secondary qualification	2	2.06
High secondary qualification	19	10.98	High secondary qualification	10	10.31
University entrance qualification	148	85.55	University entrance qualification	85	87.63
Civil status	***f***	$\%_{\text{valid}}$	**Total household net income**	***f***	$\%_{\text{valid}}$
Married and living together	139	80.35	0 - < 1000€	3	1.73
Partnership and living together	28	16.18	1000 - < 2000€	6	3.47
Partnership and living apart	3	1.73	2000 - < 3000€	31	17.92
Single	1	0.58	3000 - < 5000€	87	50.29
Divorced	2	1.16	≥ 5000€	46	26.59
Birth mode	***f***	$\%_{\text{valid}}$	**Number of children at home**	***f***	$\%_{\text{valid}}$
Spontaneous delivery	108	65.45	1	95	55.56
Operative vaginal delivery	19	11.52	2	61	35.67
Primary c-section	16	9.70	3	14	8.19
Secondary c-section	22	13.33	5	1	0.58

Note. f = frequency; $\%_{\text{valid}}$ = percentage of valid cases.

Table 4.3: *Reliability of Parametric Scales.*

	T1		T2	
	Cronbach's α	McDondald's ω	Cronbach's α	McDondald's ω
EPDS	.879	.881	.873	.875
PSS-10	.888	.890	.902	.904
PBQ-16	.860	.864	.876	.878

Note. EPDS = Edinburgh Postnatal Depression Scale, PSS-10 = Perceived Stress Scale, PBQ-16 = Postpartum Bonding Questionnaire.

19 wave in Germany, questions were asked partially retrospectively at the first time of the measurement. In addition, the following standardized questionnaires were also employed. See table 4.3 for Cronbach's α and McDonald's ω scores for both time points.

Edinburgh Postnatal Depression Scale (EPDS)

The German version (Bergant et al., 1998) of the EPDS (Cox et al., 1987), a self-rating scale with ten items, was used to assess the severity of depressive symptoms. Each item is coded from 0 to 3, a higher sum score is associated with higher severity of depressiveness (based on the last seven days). The questionnaire has been validated in a variety of studies for the identification of prepartum as well as postpartum depression (Matthey et al., 2006). The most commonly used cut-off value of 10 (EPDS score $\geq$10) showed a sensitivity of 0.96 and specificity of 1.00 in earlier research (Wisner et al., 2013).

Perceived Stress Scale (PSS-10)

With the German version of the PSS-10 as published by Reis et al. (2019) another self-report questionnaire with 10 items was used to assess the perceived stress of the participants. Item-coding is from 0 to 4 ("never" to "very often"), a higher sum score indicates a higher stress level.

Postpartum Bonding Questionnaire (PBQ-16)

A further 16-item self-report scale was used to assess participants' bonding quality, the PBQ-16 (Reck et al., 2006; founded on the original 25-item English version by Brockington et al., 2001). The items are coded from 0 ("always") to 5 ("never"), higher

sum scores mean lower and therefore more impaired bonding. The instrument looks at the frequency of certain feelings, sensations and emotions related to the interaction and relationship with the baby.

4.2.3 Statistical Analysis

We used the Statistical Package for Social Sciences (IBM® SPSS® v. 28.0.0.0) and the statistical software R v. 4.2.0 (R Core Team, 2022) in combination with RStudio v. 2022.02.2+485 for Windows (RStudio Team, 2021). Power-estimations for the main analyses were computed using G-Power v. 3.1.9.7 (Faul et al., 2009; Faul et al., 2007). Empirical p values were two-tailed. The critical α-error was set to $\alpha_{crit} = .05$. Due to their exploratory character, the analyses were not corrected for multiple testing.

Cross-Sectional Analyses

In preliminary analyses, to ensure comparability between these groups, differences in sociodemographic characteristics at T1 between fathers and mothers were explored (via linear mixed models, U-tests and χ^2-tests). In the case of significant differences, the respective variables were correlated (depending on the measurement level with Spearman or Pearson correlations) with the main outcomes, to evaluate if they needed control as confounders in the main analyses.
In the first step of the main analyses, the distribution of cases scoring below and above the EPDS cut-off as well as the EPDS, PSS-10 and PBQ-16 sample means at T1 (cross-sectional analyses) were compared to the results from prior studies (Edward et al., 2019; Gawlik et al., 2013; in a different German translation: Klein et al., 2016; Reck et al., 2006) via one-sample t-tests. In the second step, linear mixed models were used to evaluate differences between fathers and mothers regarding main outcomes at T1 (cross-sectional analyses). Model fit was quantified by the –2 log likelihood χ^2. Models were corrected for significant confounders. In these analyses, effect sizes are reported as Cohen's d. According to Cohen (1988), $d = 0.20$ are small, $d = 0.50$ are medium-sized, and $d = 0.80$ are large effects.

Longitudinal Analyses

In preliminary analyses, differences regarding sociodemographic characteristics at T1 between fathers who only responded at T1 and the fathers who responded at both assessments (T1 and T2) were explored (via t-tests, U-tests and χ^2-tests) to ensure comparability between these groups. In the case of significant differences, the respec-

tive variables were correlated (depending on the measurement level with Spearman or Pearson correlations) with the main outcomes to evaluate, if they needed control as confounders in the main analyses. Additionally, variables were checked for associations with main outcomes at T1 and T2 and controlled as a confounder if the associations were diverging between assessments.
In the main analyses, it was evaluated if the main outcomes changed from T1 to T2 (longitudinal analyses) using an ANOVA for repeated measures corrected for significant confounders. For these analyses, effect sizes are reported as partial η^2. According to Cohen (1988), $\eta^2 = .01$ are small, $\eta^2 = .06$ are medium-sized, and $\eta^2 = .14$ are large effects.

4.3 Results

Cross-Sectional Analyses (T1)

Preliminary Analyses

At T1, the father's evaluated amount of time they spend caring for their child (paternal care in percent, $M = 38.11\%$, *S.E.* $= 2.30\%$) was significantly lower than the mother's ($M = 70.51\%$, *S.E.* $= 2.45\%$; $B = 32.39\%$, *S.E.* $= 3.36\%$, $df = 191.27$, $t = 9.65$, $p < .001$). Moreover, fathers ($M = 34.76$y, *S.E.* $= 0.54$y) and mothers ($M = 33.11$y, *S.E.* $= 0.34$y) significantly differed ($B = -1.66$y, *S.E.* $= 0.63$y, $df = 158.18$, $t = -2.61$, $p = .010$) regarding age at T1. There were no other significant differences between fathers and mothers ($p > .083$). There were no associations between paternal age and main outcomes at T1 ($p > .281$), however, the evaluation of paternal care was significantly associated to the PSS-10 ($r = -.22$, $p = .004$).

Main Analyses

Comparisons to Pre-Pandemic Samples A total of 80.9% of fathers ($n = 140$) scored <10, while 19.1% ($n = 33$) scored ≥10 on the EPDS at T1. In the prior work of Gawlik et al. (2013), there were two rates computed, one for the prepartum and one for the postpartum period. In this study, more fathers scored ≥10 on the EPDS in the prepartum period. Aiming for a more conservative comparison, we chose the higher rate (9.8%; prepartum) for our comparison. The χ^2-test revealed that the rates estimated in the current father sample were still significantly higher than the ones in the reference work ($\chi^2 = 16.70$, $df = 1$, $p < .001$).

The EPDS, PSS-10 and PBQ-16 means of our sample are reported in Table 1. The EPDS mean at T1 was significantly increased ($t = 3.16$, $df = 172$, $p = .002$, $d = 0.24$) compared to the fathers' sample mean ($M = 4.32$) as reported in Edward et al. (2019). Additionally, the PSS-10 mean at T1 was significantly increased ($t = 5.04$, $df = 168$, $p < .001$, $d = 0.39$) compared to the subsample mean of men from 40 to 59 ($M = 12.61$) as reported in Klein et al. (2016). We chose this age group because the mean was higher compared to the other age groups and thus enabled a more conservative comparison. For the evaluation of the Postpartum Bonding Questionnaire (PBQ-16), we were not able to find a comparable male sample. Thus, we compared the mean in our sample to the mean of the female sample of Reck et al. (2006). We chose the mean of the depressed subsample ($M = 9.77$) as it was higher than the mean of the control sample and thus enabled a conservative comparison. The PBQ-16 mean at T1 of our current male sample was significantly increased ($t = 2.56$, $df = 172$, $p = .011$, $d = 0.20$).

Differences Between Fathers and Mothers Fathers ($M = 5.14$, *S.E.* $= 0.49$) evaluated their depressive symptoms (EPDS) at T1 as significantly lower ($B = 3.01$, *S.E.* $= 0.66$, $df = 96$, $t = 4.59$, $p < .001$, $d = 0.59$) compared to mothers ($M = 8.16$, *S.E.* $= 0.55$). This model with only fixed effects (-2 log likelihood = 1,173.19, $df = 5$) was not significantly improved with random intercepts (-2 log likelihood = 1,173.19, $df = 6$; $\chi^2 = 0.00$, $df = 1$, $p \approx 1$) or random slopes (-2 log likelihood = 1,173.19, $df = 8$; $\chi^2 = 0.00$, $df = 3$, $p \approx 1$). Additionally, we visually inspected the spaghetti-plot for differences regarding the EPDS within couples (figure 4.2).

Fathers ($M = 15.17$, *S.E.* $= 0.81$) evaluated their stress symptoms (PSS-10) at T1 as significantly less ($B = 3.48$, *S.E.* $= 1.03$, $df = 108.54$, $t = 3.37$, $p = .001$, $d = 0.44$) compared to mothers ($M = 18.65$, *S.E.* $= 0.79$). This model with only fixed effects (-2 log likelihood = 1,289.83, $df = 6$) was not significantly improved with random intercepts (-2 log likelihood = 1,289.83, $df = 7$; $\chi^2 = 0.00$, $df = 1$, $p \approx 1$) or random slopes (-2 log likelihood = 1,289.83, $df = 9$; $\chi^2 = 0.00$, $df = 3$, $p \approx 1$). Additionally, we visually inspected the spaghetti-plot for differences regarding the PSS-10 within couples (figure 4.3).

Fathers ($M = 11.34$, *S.E.* $= 0.72$) evaluated their bonding quality (PBQ-16) at T1 as not significantly different ($B = 0.18$, *S.E.* $= 0.84$, $df = 96$, $t = 0.21$, $p = .835$, $d = 0.03$) compared to mothers ($M = 11.52$, *S.E.* $= 0.69$). This model with only fixed effects (-2 log likelihood = 1,289.78, $df = 5$) was not significantly improved with random intercepts (-2 log likelihood = 1,289.78, $df = 6$; $\chi^2 = 0.00$, $df = 1$, $p \approx 1$) or random slopes (-2 log likelihood = 1,289.78, $df = 8$; $\chi^2 = 0.00$, $df = 3$, $p \approx 1$). Additionally,

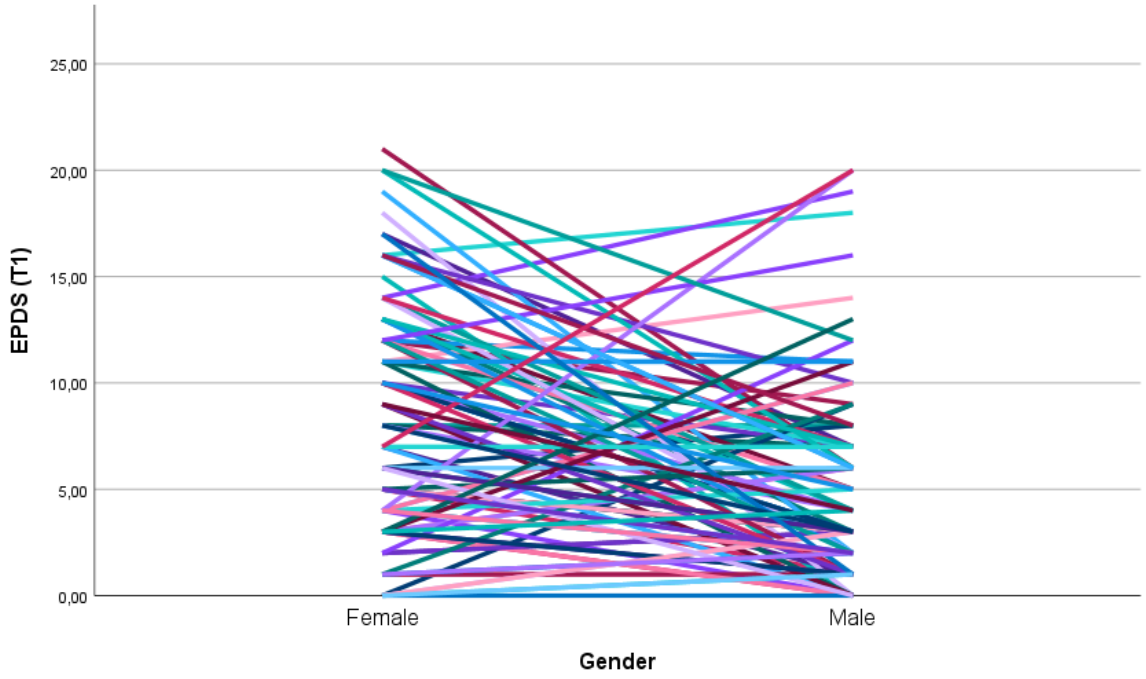

Figure 4.2: Spaghetti-plot of within couple differences regarding the EPDS. Each line represents one couple. The plot demonstrates a dominant tendency of generally heightened scores for women compared to men and a rather minor number of couple-specific differences.

we visually inspected the spaghetti-plot for differences regarding the PBQ-16 within couples (figure 4.4).

Regarding power estimation for these analyses, results from simulation studies (Maas & Hox, 2005) show that for mixed models only small samples (less than $n = 50$ couples) lead to distorted estimates of standard errors, and our sample of $n = 97$ couples exceeds this lower bound.

Longitudinal Analyses

Preliminary Analyses

Fathers who dropped out between T1 and T2 ($M = 10.21$, $S.E. = 0.67$) evaluated their bonding at T1 as significantly higher than fathers who also took part at T2 (t = -2.61, $df = 171$, $p = .010$) – meaning that with higher scores at the PBQ-16, the bonding was more impaired and therefore lower for fathers, who did not drop out ($M = 13.23$, $S.E. = 0.92$). Moreover, fathers who dropped out (mean rank = 79.13, sum of ranks = 9,337.00) and fathers who did not drop out (mean rank = 103.89, sum of ranks = 5,714.00) significantly differed in total monthly household income at T1 (U = 2,316.00,

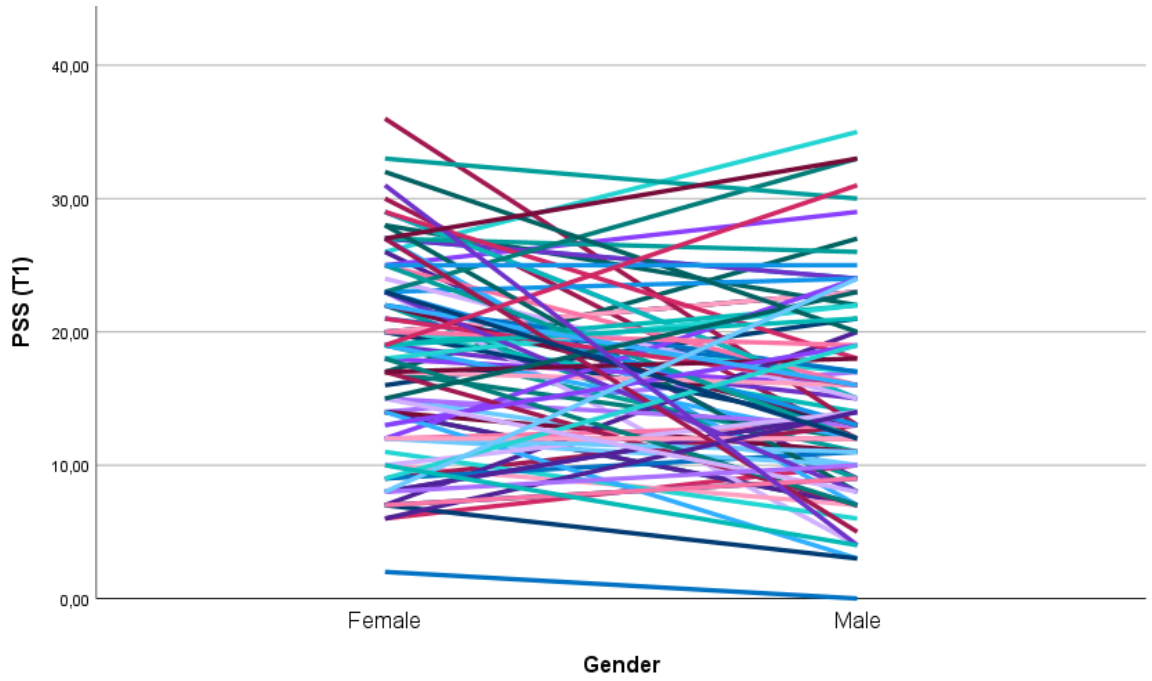

Figure 4.3: Spaghetti-plot of within couple differences regarding the PSS-10. Each line represents one couple. The plot demonstrates a dominant tendency of generally heightened scores for women compared to men and a rather minor number of couple-specific differences.

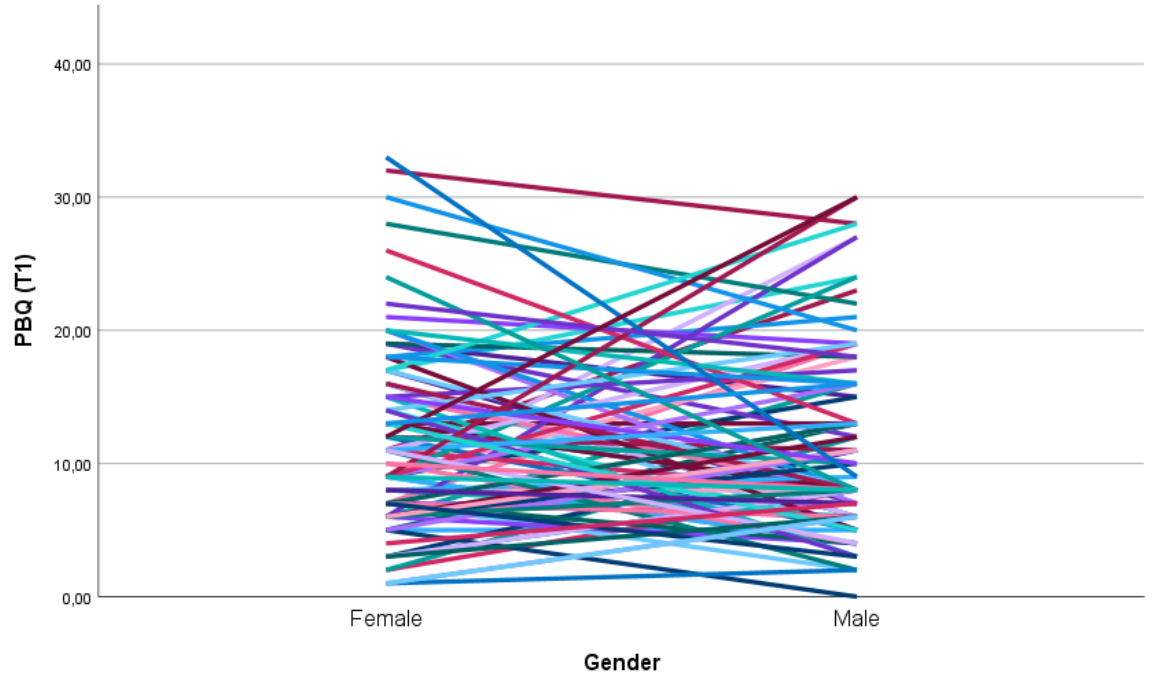

Figure 4.4: Spaghetti-plot of within couple differences regarding the PBQ-16. Each line represents one couple. The plot demonstrates a dominant tendency of similar scores for both genders and a rather minor number of couple-specific differences.

$p < .001$). There were no other significant differences between these two groups ($p > .199$). There were no associations between total monthly household income at T1 and main outcomes ($p > .179$), however, as the gestation age at birth was significantly associated to main outcomes at T2 but not T1 (EPDS at T2: r = -.31, p = .032; PSS-10 at T2: r = -.29, p = .047), we considered it a potential confounder. As it was additionally associated to bonding quality at T1 and T2 in almost exactly the same magnitude (PBQ-16 at T1: r = -.38, p = .009; PBQ-16 at T2: r = -.37, p = .010), we did not integrate it as a covariate in the ANOVA regarding PBQ-16.

Main Analyses

The EPDS mean did not significantly increase ($F(1,45) = .83$, $p = .37$, $\eta^2 = .02$) between T1 ($M = 6.32$, $S.E. = 0.82$, $95\% CI = [4.67; 7.96]$) and T2 ($M = 7.60$, $S.E. = 0.78$, $95\% CI = [4.03; 9.16]$). Additionally, there was no interaction effect between measurement timepoint and gestation age at birth ($F(1,45) = .55$, $p = .46$, $\eta^2 = .01$). There only was a main effect of gestational age at birth ($F(1,45) = .4.09$, $p = .049$, $\eta^2 = .08$). The power to detect large ($f = .40$) and medium-sized within-subject effects ($f = .25$) was virtually 1 in this analysis. However, small effects cannot be excluded with a power of $1 - \beta = .60$.

Furthermore, the PSS-10 mean did not significantly increase ($F(1,44) = .97$, $p = .330$, $\eta^2 = .02$) between T1 ($M = 16.78$, $S.E. = 1.00$, $95\% CI = [14.77; 18.80]$) and T2 ($M = 18.20$, $S.E. = 0.99$, $95\% CI = [16.19; 20.20]$). Additionally, there was no interaction effect between measurement time and gestation age at birth ($F(1,44) = .78$, $p = .383$, $\eta^2 = .02$). There even was no main effect of gestational age at birth ($F(1,44) = .3.16$, $p = .082$, $\eta^2 = .07$). The power, to detect large ($f = .40$) within-subject effects was virtually 1 in this analysis. Medium-sized within-subject effects ($f = .25$) were detectable with a power of $1 - \beta = .98$. However, small effects cannot be excluded with a power of $1 - \beta = .37$.

However, the PBQ-16 mean significantly increased ($F(1,54) = 10.16$, $p = .002$, $\eta^2 = .16$) between T1 ($M = 13.24$, $S.E. = 0.92$, $95\% CI = [11.40; 15.07]$) and T2 ($M = 14.90$, $S.E. = 0.99$, $95\% CI = [12.93; 16.89]$).

4.4 Discussion

4.4.1 Summary and Comparison of Findings

The aim of the present work was to examine perceived stress, depressive symptoms and bonding quality of fathers of infants and toddlers in times of the COVID-19 pandemic, cross-sectionally and longitudinally, as well as to compare this with the mothers' situation. All significant effects of the main analyses were small in magnitude, except the gender difference regarding the EPDS and the deterioration of bonding quality over the course of the pandemic.

The comparison of the three variables surveyed during the pandemic to before the pandemic showed a change in the condition of the fathers. In fact, relative to a pre-pandemic sample (Edward et al., 2019), depressive symptoms (EPDS) in our father sample were significantly increased at T1. In addition, 19.1% of the fathers were above the clinical cut-off of the EPDS and thus in the range of risk for developing a depressive episode. This is significantly more than in comparison with a representative German sample (9.8%; Gawlik et al., 2013). This corresponds to findings of an increase in depressive symptoms for parents at the time of the pandemic (Syed et al., 2022; Zou et al., 2022). Because depressiveness of fathers with a young child during the pandemic is still a rarely studied phenomenon, our result provides valuable insights on how depressive symptoms in fathers of young children may change under such a condition.

Fathers in this sample also showed significantly more perceived stress (PSS-10) at T1 than before the pandemic, compared to a male subsample of Klein et al. (2016). This adds to the previous finding of increased parenting stress in Israeli fathers (Taubman-Ben-Ari et al., 2021), although parenting stress varies conceptually from perceived stress. In terms of bonding (PBQ-16), fathers showed significantly worse values at T1 compared to a pre-pandemic depressed female sample (Reck et al., 2006). Andrews et al. (2022) also demonstrated in their qualitative interview study that pandemic-associated circumstances had a negative impact on initial paternal bonding.

Contrary to the previous finding that the lockdowns may have had a detrimental effect (Essler et al., 2021; M. S. Johnson et al., 2021), in our study paternal depressive symptoms and perceived stress did not deteriorate longitudinally. The means of the EPDS and the PSS-10 did not increase significantly from T1 to T2. Notably, this stable symptom level is worse than before the pandemic. However, bonding appeared to be lower at the later timepoint, with the mean of the PBQ-16 significantly increasing from T1 to T2 (with higher scores, bonding is more impaired). It can be assumed

that the general deterioration of parental mental health is also reflected in bonding quality. The relationship assumed between these constructs was already apparent upon the examination of the maternal sample from the CoviFam study (chapter 3). Here, too, maternal bonding was lower than before the pandemic, albeit descriptively, and significantly decreased during its course. Nevertheless, it has to be considered that the fathers in this study who no longer participated at T2 reported significantly higher bonding than those who remained in the study, and the sample studied is therefore selective. In this discussion, it has to be noted that no direct conclusion can be made about the clinical extent of the impairment of bonding, because the PBQ-16 has not been validated so far and no cut-off values are available (Reck et al., 2006).

In their longitudinal study, Adams et al. (2021) reported a decrease in the level of perceived stress during the pandemic, while parenting stress increased. Overall, however, as in our sample, fathers were more stressed than before the pandemic. In this context, Aguiar et al. (2021) assumed that exhaustion was enhanced because parents were challenged to successfully organize their family's daily life in an unprecedented way and at the same time received less support.

However, looking further at gender-specific factors, there are findings, that mothers were more psychologically burdened than fathers during the pandemic (e.g., Aguiar et al., 2021; Bıkmazer et al., 2021; Cheung et al., 2022). This is in line with our findings concerning depressive symptoms and perceived stress in the course of the investigation of gender differences between the fathers and the mothers within a couple at T1. The fathers reported significantly fewer depressive symptoms and perceived stress than the mothers. As far as bonding quality is concerned, similar values are reported by fathers and mothers, so they did not differ significantly here.

Moreover, future studies have to shed light on the relationship between the aforementioned and associated variables in the context of the pandemic. For example, Trumello et al. (2021) reported that perceived deterioration in the father-child relationship predicted parenting stress. Essler et al. (2021) showed that the quality of the parent-child relationship moderated the link from child well-being and problem behavior to parental strain longitudinally. With regard to gender-specific differences, Daks et al. (2022) suggested that fathers might be more vulnerable to cascading *spillover effects* concerning family dynamics and well-being. Such a spillover effect was also described by Russell et al. (2021), in the sense that an increased level of perceived stress, anxiety and decreased closeness with their children occurred in those individuals, who also exhibited depressive symptoms of clinical significance (34.9% in this sample, thereof 56.9% fathers). In an associated study, Russell et al. (2022) revealed that caregiver burden and the quality of parent-child relationship have a stronger association with depressive

symptoms and the spillover to perceived child stress in fathers than in mothers. This not only highlights the importance of pandemic-specific tailored support for fathers to prevent the spread of symptoms and burden, but also to counteract the impairment of more areas of their lives and the quality of their relationships with their children. Essler et al. (2021) also showed that children benefited in terms of well-being and problem behavior as parental stress dropped during the pandemic. However, not only the relationship with the child, but also the partner relationship could be of meaning for both clinical implications and further research. For example, in a non-pandemic sample, it was found that paternal postpartum bonding was predicted by prepartum paternal relationship satisfaction (Morris et al., 2022). Furthermore, a moderation through the paternal relationship satisfaction on the relation between the prepartum bonding of mothers and fathers was found.

According to the population studied by Andrews et al. (2022), the circumstance that a number of fathers could not participate in examinations of their pregnant partners during the pandemic mirrors traditional role stereotypes that fathers do not hold a significant place in motherhood. Even more, the fathers expressed that this had negatively affected the expectant mothers in terms of their psychological well-being. Fathers in this study considered their elevated participation in parenting tasks and responsibilities as a result of the structural changes during the pandemic to be beneficial. Given the deterioration in fathers' mental health and bonding in our sample compared to pre-pandemic levels, this may be a promising focus for future research as well as a prevention approach in clinical practice.

4.4.2 Limitations

Since studies used for comparison often have different age criteria (such as shortly after birth, or older children) than the population studied, the overall comparability with these is limited. On the other hand, this emphasizes the strength of this study in targeting a less investigated age group, together with filling a research gap by examining the mental health and bonding quality of fathers during the pandemic longitudinally. Further limiting is the fact that in some cases the comparison samples refer to non-matching populations (e.g., mothers instead of fathers) due to the lack of fitting father samples. In addition, many of the selected studies use parenting stress as a variable, which differs as a construct from the variable of perceived stress that we used. In order not to impose too long assessment times on the subjects, we chose the PSS-10 as sole measure to use an instrument of a more general character regarding the pandemic conditions. All in all, it may be that some comparisons may lead to biased conclusions.

Further limitations of this sample are the relatively high level of education and the associated impairment of representativeness. For obtaining reliable clinical information, it would also have been preferable to use clinical interviews and/or behavioral observations rather than questionnaires when possible and appropriate, although this would not have been compatible with the study design of a low-threshold (anonymous) online study. The long initial survey period could also have had a biasing effect but was preferred in favor of collecting a larger sample. Thus, we were not able to sufficiently control for potential effects of meantime events. In order to capture pandemic-specific topics and issues, also at the time of the greatest restrictions at the beginning of the pandemic, it was necessary to use a self-developed, pandemic-specific questionnaire, which also contained retrospective questions, in addition to the standardized measurement instruments.
Most importantly and despite the longitudinal part of the study design, we are not able to draw any causal conclusions with our assessment and analytic design. Thus, conclusions regarding direct effects of the pandemic or lockdown periods should be interpreted very cautiously.

4.4.3 Conclusion

The present work demonstrates that mental health and bonding among fathers of infants and toddlers changed during the COVID-19 pandemic. Paternal depressive symptoms, perceived stress, and bonding were shown to be significantly and persistently worse during the pandemic compared to before, with bonding quality further deteriorating during its course. In terms of depressive symptoms and stress, mothers were found to be even worse than their male counterparts. With regard to bonding quality, there were no gender-specific differences. Taken together, the results of the present study illustrate that fathers should be the subject of continued research on relationship, family, and parenting dynamics, and that their role under pandemic conditions must not only be further investigated but also addressed in medical and psychosocial support for families with infants and toddlers.

Chapter 5

Study 4: Students' Mental Health in Germany During the COVID-19 Pandemic

Finally, the cross-sectional study 4 is presented in this chapter. It was aimed to investigate the prevalence of perceived stress and depressive symptoms in German students of higher education facilities during the COVID-19 pandemic. The preregistered assumptions were that depressive symptoms and perceived stress increased compared to before the pandemic. Thus, comparisons with pre-pandemic samples were conducted.

5.1 Theoretical Backround

As a global event, the COVID-19 pandemic represents a challenge and a burden for the entire society, and it became apparent early on that this leads to psychological distress in the general population (Krishnamoorthy et al., 2020; Salari et al., 2020; Xiong et al., 2020). Students appeared to be a vulnerable group in this context (Xiong et al., 2020), but also before the pandemic. For example, Cavallo et al. (2016) reported increased perceived stress in a sample of Italian students, while Rueckert & Ancane (2018) indicated elevated depressive symptoms and anxiety for a sample of medical students in Latvia (40.1% Latvian and 59.9% international students, 11% of them German) compared to the general population. In a survey of German students, 53.6% showed at least one psychological syndrome of those investigated (Weber et al., 2020). In terms of psychological syndromes, depressive symptoms were the most common, with almost a quarter showing a major depressive syndrome. In another German

student sample (Bailer et al., 2008), one or more of the psychological syndromes assessed (excluding probable alcohol abuse or dependence) could be found in 22.7% of the cases, with depressive syndrome being most common among these (14.1%). Nevertheless, probable alcohol abuse or dependence was found to be predominant in this study (30.2%). Schlarb et al. (2017), in a study with students from Luxembourg and Germany (90.27%), showed that there were mainly elevated sleeping problems with poorer sleep quality in 42.8% of the cases (17.9% clinically relevant). Additionally, 25.5% showed signs of a depressive syndrome, 13.3% social phobia symptoms and 45% increased stress. Further results on the condition of students can be found by Auerbach et al. (2018) in a wide-ranging WHO study across eight countries regarding students in their first year, in which major depression was the most prevalent of the disorders assessed in the self-report screening, with a lifetime prevalence of 21.2% and a 12-month prevalence of 18.5%. In the previously mentioned study by Rueckert & Ancane (2018), depressive symptoms occurred in 41.8% and 20% of Latvian and international students, respectively, somatic symptoms in 40.3% and 36%, and anxiety in 31.3% and 14%. In the aforementioned study by Weber et al. (2020), a relation was found between positive screening for psychological syndromes and thoughts of discontinuing their academic studies, meaning that students with positive screening were more likely to have these thoughts than students without positive screening. This in turn was particularly common among students who had a depressive syndrome and a suicidal tendency.

The period of the COVID-19 pandemic brought new challenges and stressors for students in Germany and all over the world. In addition to sometimes drastically restricted contacts, university teaching was broadly converted to online teaching and often forms of examination had to be adapted to the new situation (Diel et al., 2021). In their student sample, assessed during the pandemic, Barbosa-Camacho et al. (2022) showed that anxiety or depressive symptoms were prevalent in over 80%, whereby depressive syndromes occurred more often with 61.5%. In the survey of Holm-Hadulla et al. (2021), during the pandemic, 72.2% of the students reported a severe impact on their well-being. Further, they reported possible psychological problems for 75.8% of cases, with depressive syndromes standing out at 59.1%, which represents an increased rate compared to before the pandemic. Yu et al. (2021) likewise found an increased rate of depressive symptoms among students (56.8%). However, there are also findings on perceived stress of students that contradict this trend. Benham (2021) found that the students surveyed reported lower levels of perceived stress compared to before the pandemic. On the other hand, Elmer et al. (2020) found an increase in perceived stress,

depressive and anxiety symptoms as well as loneliness in their student sample (engineering/natural sciences), even though some experienced as positive how the pandemic situation had an impact on issues such as *Fear of Missing Out* or competitive behavior.

In light of these findings, it is particularly important to take a closer look at the condition of students during the pandemic. Depressive symptoms seem to be of central significance here. Since stress and depressive symptoms appear to be closely related (Hammen, 2005), the aim of this study is to investigate the prevalence of perceived stress and depressive symptoms in a German student sample at the time of the COVID-19 pandemic. Despite some variation in results, the literature shows a clear trend toward declining mental health among students during the pandemic, which supports our hypotheses that both perceived stress and depressive symptoms increase in our student sample compared to pre-pandemic samples.

5.2 Method

5.2.1 Sampling Procedures and Participants

The CoviStud survey is an online cross-sectional survey regarding the mental well-being of students of universities (including universities of applied sciences) in Germany at the time of the COVID-19 pandemic. Students were reached and recruited through student councils, student representative boards, social media, university notices, and newsletters. Out of 80 German universities requested, at least 40 student councils or student representative boards in 34 cities forwarded the request to participate in the study. Requirements were to be registered at a university and to have solid German language skills. Participation was anonymous, but after completion, there was the option of providing an email address for follow-up surveys. Personal information was separated from collected data and not accessible for the investigators. The participants could also take part in a lottery for a total of 100€ (split into 50€, 30€ and 20€). The access link to the study was available from December 9th 2021 until March 23rd 2022, as covid-related regulations were strict in Germany. The study was preregistered at aspredicted.org (https://aspredicted.org/VRY_19H; so far only a part of the analyses has been carried out).

The sample included a total of 3674 students. If there were incomplete cases concerning our key dependent variables, these cases were listwise excluded. This included the first 130 participants who were not presented with an item regarding the key dependent variables due to an error. Outliers were not excluded. After all exclusions, the sample

on which the analyses are based comprises $N = 2690$ students (71.6% female; 26.0% male; 2.4% diverse). Age range was 16 to 61 years ($M = 23.1$; $SD = 4.1$), 19.0% had a migration background. Regarding relationship status, 50.3% indicate to live in a relationship (20.3% joint household, 30.0% separate household) and 49.7% answered not being in a relationship. Having children was affirmed by 2.9%. They attended different universities (Ludwig Maximilian University of Munich = 21.2%, Technical University of Munich = 1.4%, University of Applied Sciences of Munich = 0.7%, other Munich university: 0.6%, other university = 76.1%), were distributed over different semesters with a range of 1-15[1] and studied in a wide range of subjects[2]. In comparison (descriptive) with the most recent regular nationwide survey of the economic and social situation of students in Germany, it is noticeable that the proportion of women appears to be different in our sample (Middendorff et al., 2017; female = 48%, male = 51%, unassigned = 1%; mean age = 24.7 years; migration background = 20%; no relationship = 46%; having children = 6%).

5.2.2 Measures

The following standardized self-report measures were used in combination with a self-developed questionnaire (von Tettenborn et al., 2023) to assess the participants' socioeconomic status as well as study-, health-, and pandemic-related information.

Perceived Stress Scale (PSS-10)

To assess individual levels of perceived stress, the German version of the Perceived Stress Scale (PSS-10; Schneider et al., 2020) was used. The PSS-10 consists of 10 items (response scale: 5-point Likert scale from 1/"never" to 5/"very often") and the total score is calculated as the sum of all items. In the present sample, Cronbach's α equals .88, McDonald's ω equals .89.

Patient Health Questionnaire (PHQ-D)

Using the German version of the Patient Health Questionnaire (PHQ-D; Löwe, Spitzer, et al., 2002; Löwe, Zipfel, et al., 2002), some items in it served for descriptive infor-

[1] 1 = 17.9%, 2 = 2.2%, 3 = 19.0%, 4 = 1.9%, 5 = 16.7%, 6 = 1.6%, 7 = 13.9%, 8 = 2.3%, 9 = 9.4%, 10 = 2.0%, 11 = 5.5%, 12 = 1.6%, 13 = 2.5%, 14 = 1.1%, 15 = 2.4%

[2] Psychology, teaching with school psychology or special education = 14.4%, teaching (all other combinations) = 18.3%, mathematics, computer science, natural sciences= 18.4%, engineering = 8.2%, humanities (e.g., theology, linguistics/cultural studies) = 9.6%, social sciences (e.g., social work, political science, communication studies, education) = 8.7%, (veterinary/dental) medicine = 11.4%, performing/visual arts = 0.4%, athletic sciences = 0.2% /business and law = 4.3%, other = 6.1%

mation and depressive symptoms were assessed with the dedicated module PHQ-9. These 9 items are asked along DSM-IV criteria for a major depressive syndrome or other depressive syndromes (response scale: 4-point Likert scale from 0/"not at all" to 3/"nearly every day"). A scale sum value between 0 and 27 can be calculated using the item scores. A score of less than 5 is (basically always) considered indicating the absence of a depressive disorder, a score between 5 and 9 is considered referring to a mild depressive disorder, and a score of ≥ 10 is considered referring to a major depressive disorder. Regarding the major depressive syndrome, the severity can be further determined from moderate (10-14), moderately severe (15-19) and severe (20-27). With the Patient Health Questionnaire (PHQ-D), it is possible to diagnose at a syndrome level. For the diagnosis on a disorder level, further information is required, which is not provided by the instrument (Kroenke et al., 2001; Löwe, Spitzer, et al., 2002; Spitzer et al., 1999). In the present sample, Cronbach's α equals .87, McDonald's ω equals .87.

5.2.3 Statistical Analysis

All data processing, statistical analysis and power estimations were done in R and RStudio (R Core Team, 2022; version 4.2.1; RStudio Team, 2022). First, we conducted descriptive analyses for the PHQ-9 and for additional study-, health-, and pandemic-related information regarding our sample and calculated the relative share of our sample that is above established cut-off values for the PHQ-9 as well as the rate for suicidal thoughts and self-harm. Second, we used one-sample t-tests (one-tailed) to compare the sample means of PSS-10 and PHQ-9 with results from Schneider et al. (2020) and Schlarb et al. (2017) that were published prior to the pandemic. In addition to our preregistered analyses, we exploratorily compared the distribution of cases scoring above the cut-off value for a major depressive syndrome on the PHQ-9 (≥ 10; two-tailed), with a group, which was diagnosed with major depression (Gräfe et al., 2004). The critical α-error was set to $\alpha_{\text{crit}} = .05$. Effect sizes are reported as Cohen's d. According to Cohen (1988), we interpret effect sizes $d = 0.20$ as small, $d = 0.50$ as medium-sized, and $d = 0.80$ as large effects.

5.3 Results

Descriptive Analyses

During the pandemic, 6.8% of the students in our sample reported moving back in with their parents. On a 5-point Likert scale from "not at all" to "very much", 41.2%

answered the question of how much they felt burdened by the general pandemic-related restrictions with a value of 4 or 5, and 75.2% said they were limiting their contacts because of the pandemic. When asked how the number of friends had changed compared to pre-pandemic times, 55.2% indicated that it had decreased "a little" or "a lot". With regard to the importance of friendships, 15.0% reported that these had decreased "a little" or "a lot" and 65.7% reported that the difficulties in making contact with people had increased "a little" or "a lot". On a 5-point Likert scale from "not at all" to "very much", there were – with values of 4 or 5 – 33.8% of students worried that their studying would be prolonged, 57.6% that they would learn less than under "ordinary" circumstances, and 57.7% that they would not be able to meet the requirements in their studying. When asked if they could earn fewer ECTS (European Credit Transfer and Accumulation System) credits under pandemic conditions than they had been able to earn under "ordinary" circumstances, 29.6% answered in the affirmative, 61.4% indicated that they were able to earn the same amount (9.0% indicated being able to earn more). In addition, 35.5% stated they had experienced a lack of medical, psychotherapeutic, or other care due to the pandemic. Regarding questions taken from the PHQ-D, 8.0% reported taking medication for anxiety, depression, or stress and 4.4% reported having been hit, kicked, or otherwise physically harmed by someone or forced to commit an unwanted sexual act in the past year. In addition, 11.6% reported feeling "very affected" (in the past four weeks) by something bad that happened recently, and 13.19% by thoughts of or dreams about terrible events from the past (e.g., destruction of home, serious accident, physical violence, forced sexual act).

Regarding the cut-off for a major depressive syndrome, 36.7% of the students ($n = 987$) scored < 10, while 63.3% ($n = 1703$) scored ≥ 10 on the PHQ-9. Thereof, 29.0% scored above the cut-off for a moderate, 20.5% for a moderately severe and 13.8% for a severe major depressive syndrome. To the question about being affected by thoughts of being better off dead or hurting oneself, 5.8% answered "more than half the days" and 3.8% answered "nearly every day". This represents a total rate of 9.7%.

One-Sample *t*-Tests

One-sample t-tests revealed that the overall PSS-10 mean ($M = 33.59$, $SD = 6.76$) was significantly increased ($t = 40.40$, $df = 2689$, $p < .001$, $d = 0.78$) compared to the nonclinical online sample mean ($M = 28.33$) as reported in Schneider et al. (2020). To conduct a more conservative comparison, the PSS-10 mean of our sample was also compared with the clinical sample mean ($M = 31.61$) as reported in Schneider et al.

(2020). Here, too, the mean was significantly higher (t =15.22, df = 2689, $p < .001$, $d = 0.29$) in the present sample.

Similarly, the PHQ-9 mean ($M = 12.07$, $SD = 6.15$) in our sample was significantly higher ($t = 40.48$, $df = 2689$, $p < .001$, $d = 0.78$) compared to the German university students sample mean ($M = 7.27$) as reported in Schlarb et al. (2017). In their German validation study of the PHQ-D, Gräfe et al. (2004) reported the PHQ-9 mean sum score of a population of patients who were diagnosed with major depression using a structured clinical interview according to DSM-IV. Given the high rate in the present sample scoring above cut-off for a major depressive syndrome, the mean of this subsample (M = 15.78) was compared to the mean of the pre-pandemic subsample with a diagnosis of major depression ($M = 17.9$) as reported in Gräfe et al. (2004), in order to make a more conservative comparison. Here, the mean in our sample for major depressive syndrome was significantly lower (t = -20.23, $df = 1702$, $p < .001$, $d = 0.49$) than in the sample diagnosed with major depression from Gräfe et al. (2004).

The power to detect large ($d = 0.80$), medium-sized ($d = 0.50$), and small effects (d = 0.20) was virtually 1 in these analyses. Thus, significance can be assumed for small, medium, and large effects.

5.4 Discussion

5.4.1 Summary and Comparisons of Findings

The aim of the present study was to investigate the prevalence of perceived stress and depressive symptoms in a sample of students in Germany. We reported descriptive analyses regarding the relative share of our sample that is above established cut-off values for the PHQ-9 and the rate for suicidal thoughts and self-harm, as well as for additional study-, health-, and pandemic-related information. Further, we undertook one-sample t-tests to compare the sample means of PSS-10 and PHQ-9 with comparison means from before the pandemic. Additionally, we compared the distribution of cases scoring above the cut-off value for a major depressive syndrome on the PHQ-9 with a group, which was diagnosed with major depression (pre-pandemic).
Our findings suggest that perceived stress (PSS-10) increased significantly with a medium effect (close to large) when compared to a pre-pandemic nonclinical sample (Schneider et al., 2020). In comparison to a clinical sample from the same study, a significant increase was also shown, even if with a small effect. Higher perceived stress in students during the pandemic is in line with previously published findings during the

pandemic (Elmer et al., 2020), even if the information seems to be less clear and well documented than in the case of psychological syndromes such as depression. Regarding depressive symptoms, the PHQ-9 mean in the current sample was also significantly higher with a medium effect (close to large) compared to a pre-pandemic student sample (Schlarb et al., 2017). The increase of depressive symptoms in students during the pandemic is reflected in the literature (Elmer et al., 2020; Holm-Hadulla et al., 2021; Yu et al., 2021), even though reported PHQ-9 means differ, for instance, from 7.9 (Teuber et al., 2021) to 11.6 - 11.9 (Barbosa-Camacho et al., 2022; Holm-Hadulla et al., 2021). An outstanding finding was the high rate of cases scoring above the cut-off for a major depressive syndrome as measured by the PHQ-9 in our sample (63.3%). Even though other studies reported high rates at the time of the pandemic using the same measurement instrument as well (Barbosa-Camacho et al., 2022; Holm-Hadulla et al., 2021) and the cut-off value of the PHQ-9 of 10 or more merely implies the presence of a major depressive syndrome and not the clinical diagnosis of a major depression, we compared this group to a pre-pandemic subsample with diagnosed major depression (Gräfe et al., 2004). Here, the mean in our sample was significantly lower with a small but close to medium effect. Our results are possibly influenced by the high sensitivity of the PHQ-9 (Gräfe et al., 2004; see also Weber et al., 2020). The overall rate of 9.7% who stated thoughts of "being better off dead" or hurting oneself appears to be lower (descriptive) than the rate of 17.8%, Martínez-Líbano & Yeomans Cabrera (2021) give in their systematic review of suicidal ideation and thoughts in university students during the pandemic. It should be noted though that the rate we report is also based on criteria that could be considered strict, since we did not include subjects who reported having these thoughts only on "several days". Our findings are also relevant in the context that Weber et al. (2020) found in their pre-pandemic study that particularly students with depressive syndrome and suicidal tendency had thoughts of discontinuing their academic studies.

In order to better understand the increase of perceived stress and depressive symptoms in the present sample, additional analyses of the relations between these two and other surveyed variables as well as other constructs would be needed to explore underlying dynamics. For example, in a pre-pandemic student sample, Reifman & Dunkel-Schetter (1990) showed that it had beneficial effects in terms of depressive symptoms and perceived physical well-being if the students had regular contact with other students. This becomes particularly relevant in the time of the pandemic with regard to contact restrictions and change to online classes. In this context, 75.2% of the students in our sample reported limiting their contacts because of the pandemic, over half reported a decrease in the number of friends and 65.7% found it more difficult making contact

with people. After all, 15% also stated that friendships had become less important. Regarding study-related concerns (prolonged studying: 33.8%, learning less: 57.6%, not meeting requirements: 57.7%), the participants in our sample appear burdened. In addition, 29.6% stated that they were able to acquire fewer ECTS credits under pandemic conditions (61.4% were able to earn the same, 9.0% more). In comparison, Barbosa-Camacho et al. (2022) reported that 80.8% of the students in their sample felt that their performance deteriorated with the change to online classes, and that 40.5% stated to have lower grades. For 48.5%, the change to online classes had made no difference regarding their grades (11% had higher grades). Increased values for depressive symptoms (PHQ-9) were related to decreased academic self-concept. Benham (2021) further found that greater problems with sleeping and sleeping habits were related to increased perceived stress (although in this student group, perceived stress was not elevated at the time of the pandemic).

The results of our study not only support the postulated hypotheses that perceived stress and depressive symptoms have increased among students compared to before the pandemic, but also indicate, in association with other publications on this topic, that further research to explore underlying mechanisms could yield valuable insights. However, the condition of the students in our sample concerning stress and depressive symptoms and that 35.5% have indicated experiencing a lack of medical, psychotherapeutic, or other care due to the pandemic also stresses the need for them to receive adequate support.

5.4.2 Limitations

There are a few limitations regarding the interpretation of our findings that have to be discussed further. First, the present study was conducted in a cross-sectional design, which means that no causal conclusions can be drawn. However, a longitudinal design and procedure is planned. Although the pandemic situation itself may be seen as a traumatic event (Kaubisch et al., 2022), the influence of other traumatic events and burdens independent of the pandemic cannot be excluded as alternative pathogenic factors and should be investigated in further studies. It would also be important to investigate the rate of university-dropouts in future research. Since it is not possible to clearly determine how many students were invited to participate in the survey due to the recruitment via contact persons, in some cases from other universities, only incomplete statements can be made about the response rate. Furthermore, particularly regarding the high rates of depressive symptoms, it would be advisable to analyze the data regarding careless responding patterns and consider applying prevention strategies

in the future (Ward & Meade, 2023). The increased proportion of women can be seen as a further limitation to the representativeness of our sample. Since female gender in the pandemic has been associated with belonging to a risk group for mental health problems (Kowal et al., 2020; Xiong et al., 2020), gender differences should also be taken into account in future studies. This concerns our sample in particular, as it consists of more women. Since there were some students who experienced improvement in their academic results, this should be included in future research in the context of analyzing resilience factors or factors that made it possible to benefit from the given situation. In order to be able to make a reliable statement about the presence of clinically relevant disorders, clinical interviews with the participants would have to be conducted, which was not possible due to the online study design.

5.4.3 Conclusion

The present study underlined that students can be seen as a vulnerable group in the period of the pandemic. There were significantly elevated levels of perceived stress and depressive symptoms compared to pre-pandemic studies, and a high rate of cases scoring above the cut-off for a major depressive syndrome. This clearly shows how important support adjusted to the needs of the students is in such crisis situations, but also in general, in order to create the conditions for learning and development as well as to counteract tendencies of discontinuing the academic studies. In the past, for example, an intervention study by Deckro et al. (2002) showed the positive impact of mind/body interventions (physiological relaxation response induced by conscious exercises and cognitive behavioral techniques) on psychological well-being and perceived stress of students. One of the key issues in providing adequate support to students could be to conduct regular low-threshold surveys at universities and/or departments in order to be able to assess and respond to students' needs.

Chapter 6

Overall Discussion

6.1 Findings and Contributions

The aim of the present work was to investigate the mental health and psychosocial relations of different populations in the COVID-19 pandemic. The focus was on infant behavioral problems, the condition of parents of infants and toddlers, and the psychopathology of students. Although new studies on pandemic-related mental health and associated topics are constantly being published, some of the topics addressed here still seem to be underrepresented. The findings of this work provide important further insights into the condition of different (at-risk) populations in the ongoing pandemic. In the following, the results of the four empirical studies presented will be considered and discussed together, and further specifics and contributions will be provided.

The cross-sectional study 1 aimed to assess potential infant behavioral problems (crying, sleeping, and feeding/eating behavior) in the vulnerable first year of life and the associated maternal psychological burden during the COVID-19 pandemic, including the time of greatest restrictions. Further, maternal depressive symptoms and perceived stress were investigated, as well as bonding and relationship satisfaction as possible protective factors (Fakhri et al., 2019; Reck et al., 2016).
In study 1 it could be shown that the mothers were at increased risk for a depressive episode, which is in line with findings from Ceulemans et al. (2021). Also, the higher maternal perceived stress compared to before the pandemic is reflected in findings from Kowal et al. (2020). For 21.7% of the infants, prolonged sleep onset latencies and/or increased night awakenings were reported, which is similar to the already mentioned study from Zreik et al. (2021). Findings from Perez et al. (2021) and Markovic et al. (2021; at the beginning of the pandemic) likewise showed an increase in sleeping

problems. The further reported increased crying but not increased feeding problems during the pandemic (Perez et al., 2021) only partially correspond to the results of study 1. Here, there was a low occurrence of excessive crying or eating and feeding problems. In the studies by Reinelt et al. (2022) and Buechel et al. (2022), though, all areas of the assessed infant regulatory problems were shown to be elevated in the pre-pandemic comparison. As for reported high maternal burden due to infant crying or sleeping behavior, nevertheless, rates of 28.7% and 19.3% (8.9% due to feeding and eating behavior), respectively, are shown in the study 1 sample. In a similar measurement of the amount of stress parents (94% mothers) experience due to infant regulatory problems, Buechel et al. (2022) in turn reported rates of 19.5%, 15.2%, and 3.1% for stress experienced as fairly high or very high due to infant crying, sleeping, and eating behavior.

Continuing to look at maternal burden in study 1, there was an association between reported burden due to infant crying and sleep behaviors and increased perceived stress, but not for depressive symptoms (for which chronic burden or previous depressive illness might be playing a more significant role; Reck et al., 2008). As stable family relationships are known to be protective factors in the development of postpartum mental health problems (e.g., Reck et al., 2016), as expected, mothers in the study 1 sample reported less burden related to positive relationship characteristics – bonding quality and relationship satisfaction.

Furthermore, higher levels of burden due to infant behavior was reported by mothers, who had to care for more than one child, if they perceived a lack of medical, psychotherapeutic, or other care or if they reported that their infant cried more or took a long time to fall asleep (more than 45 minutes). Also, the burden due to crying, sleeping, feeding, and eating behavior as well as the extent to which bonding was lowered increased along with the age of the infant. On the one hand, the dynamic that maternal tiredness and exhaustion are related to infant crying (Kurth et al., 2011) and that this could be intensified during the pandemic and on the other hand increased family "chaos" (A. D. Johnson et al., 2022) and the associated increasing maternal burden, especially when there are more and younger children in the household (Kracht et al., 2021), could explain these findings. Further, risk factors for maternal burden and affected parent-infant relationships – in the context of the presented risk and resilience model of Prime et al. (2020) – could be seen in increasing infant age and the accompanying longer-lasting burden, more than one child in the household, as well as an insufficient care system as a pandemic-specific factor. Similar, Buechel et al. (2022) found that among others, increasing child age predicted higher parenting stress and mental health problems. They also indicated a correlation of child mental health

problems and parent mental health problems and stress.

Overall, the international body of studies on infant regulatory problems and associated maternal burden does not seem to be very extensive. It appears that similar studies also often include or only include children aged above 1 year, and publications that include the area of child sleeping behavior tend to be the most common (e.g., in addition to those already mentioned: Dayton et al., 2022; Di Giorgio et al., 2021; Khoory et al., 2022). Thus, also in light of the to some extent inconclusive literature, the results of study 1 provide an important contribution investigating the situation of infants and their mothers in the COVID-19 pandemic.

Beyond that, for the English translation of the already published study, a diligent clarification of the terminology used in the field of infant regulatory problems was conducted through literature research and expert consultation. The terminology used and recommended shall be presented below for an overview and may also serve as an orientation for other researchers. In the area of infant regulatory problems, the term *infant behavioral problems* can be used. In general, one can refer to *crying*, *sleeping*, *feeding/eating*; *sleep behavior/sleeping behavior*, *feeding/eating behavior*, *sleeping problems*, *feeding and eating problems*. In the area of sleeping problems, it is common to use *problems falling asleep*, infant *took longer to fall asleep at night*, *(prolonged) sleep onset latency* as well as *problems staying asleep (during the night)*, *defined as increased night awakenings*, or infant *woke up more often at night*. Also possible are *insomnia*; *sleep onset insomnia*; *problems staying asleep all night*. In the area of feeding and eating problems, one can use, following the A criterion of the "Avoidant/Restrictive Food Intake Disorder" of the DSM-5 (APA, 2013): *lack of interest in eating or food*, *inability or refusal to eat sufficient quantities or variety of food*, *increased sensitivity regarding the characteristics of the food*, *restrictive food intake*. In the area of crying, the terms *(excessive) crying*, *fussing*, *high-pitched crying*, *screaming*, *unexplained crying* or infant is *difficult to calm* are used.

In the longitudinal study 2, the focus lay on the role of maternal bonding in the relationship between depressive symptoms and perceived stress during the COVID-19 pandemic in mothers of children aged 0–3 years. The investigation of mediating effects was conducted to show if depressive symptoms might convey their effect on perceived stress via lower bonding, and moderating effects were explored to show if bonding might affect the strength of the long-term effect of depressive symptoms on perceived stress.

Findings of study 2 suggested a lower bonding quality of the mothers investigated compared to a pre-pandemic sample of healthy and clinically depressed mothers (Reck

et al., 2006). This is in line with studies of non-clinical samples from D. V. Fernandes et al. (2021a) and Suzuki (2022). Moreover, maternal bonding in the study 2 sample worsened over the course of the pandemic. The overall level of depressive symptoms and perceived stress was also elevated and increased from the first to the second measurement point, which might be related to greater pandemic restrictions at the time of the second assessment (see Woll, 2022; also Ceulemans et al., 2021). Altogether, there were other findings of elevated maternal depressive symptoms and stress during the pandemic (e.g., Chmielewska et al., 2021; Racine et al., 2022; Safi-Keykaleh et al., 2022; Suárez-Rico et al., 2021).

Looking at the longitudinal relation of maternal depressive symptoms, perceived stress, and bonding in the study 2 sample, significant reciprocal predictions between depressive symptoms and perceived stress were found (in line with previous research regarding these variables; Hammen, 2005). CLPMs indicated and corroborated a mediating effect of bonding. In singled out mediation and moderation analyses, a small partially mediating and a small moderating effect of bonding were found. On the one hand, this indicates that part of the long-term negative effect of mothers' depressive symptoms on perceived stress was transmitted via lower bonding. Regarding the moderation analysis, it could be assumed that mothers with higher bonding and at the same time more depressive symptoms suffer from worries about their depressive symptoms affecting their relationship with their child and therefore also show more symptoms of perceived stress in the long-term. Finally, the positive association between bonding and perceived stress in the study 2 sample suggests that higher bonding might act as a protective factor regarding maternal well-being during the COVID-19 pandemic. Additional CLPMs to explore control variables (sociodemographic and pandemic-related variables) that might be relevant showed that the coefficients were so small that they were not included in the main analysis, even when some of them had indicated significant bivariate correlations with the investigated key variables.

In study 3, paternal perceived stress, depressive symptoms and bonding quality of fathers of infants and toddlers (0-3) during the COVID-19 pandemic were investigated cross-sectionally and longitudinally. Further, gender differences regarding these variables between the fathers and the mothers within a couple were explored.

The results of study 3 revealed a change in fathers' condition compared to before the pandemic. Depressive symptoms at the first measurement time point significantly increased compared to a pre-pandemic sample (Edward et al., 2019). Also, the rate for fathers in study 3, who scored above the clinical cut-off of the EPDS and thus in the range of risk for developing a depressive episode was computed (19.1%) and

also appeared to be significantly higher than before the pandemic (9.8%; Gawlik et al., 2013). An increase in parental depressive symptoms during the pandemic was also shown by Syed et al. (2022) and Zou et al. (2022). Moreover, paternal perceived stress in the study 3 sample was significantly increased compared to a pre-pandemic sample (Klein et al., 2016), which adds to findings of Taubman-Ben-Ari et al. (2021), who reported an increase of paternal parenting stress during the pandemic. Finally, paternal bonding quality of the study 3 fathers significantly deteriorated compared to a pre-pandemic sample (Reck et al., 2006), which was similarly shown in a qualitative interview study on the negative impact of pandemic-associated circumstances on initial paternal bonding (Andrews et al., 2022).

With regard to the longitudinal findings, paternal depressive symptoms and perceived stress in study 3 appeared not to be worsened. This is in contrast to results of previous studies, where greater pandemic restrictions seemed to be related to detrimental effects (Essler et al., 2021; M. S. Johnson et al., 2021). Nevertheless, even though depressive symptoms and perceived stress have not changed significantly in an adverse way with the greater restrictions, overall, they remain stable at a worse level than before the pandemic. In turn, the bonding quality of the fathers in study 3 deteriorated significantly over the course of the pandemic. Altogether, other longitudinal studies, such as Adams et al. (2021) also reported a higher overall stress level compared to before the pandemic. In detail, they indicated a decrease of perceived stress and an increase of parenting stress during the course of the pandemic. Aguiar et al. (2021) assumed that exhaustion was exacerbated because parents were uniquely challenged to successfully organize their family's daily life and at the same time received less support.

The investigation of gender-specific differences in study 3 revealed that fathers reported significantly fewer depressive symptoms and perceived stress than the mothers at T1 (within a couple), but similar values regarding bonding quality (no significant difference). In this context, there are a few previous studies that point to a higher psychological burden for mothers during the pandemic (e.g., Aguiar et al., 2021; Bıkmazer et al., 2021; Chung et al., 2020).

Future studies have to investigate the relation between paternal depressive symptoms, perceived stress and bonding, as well as associated variables in the pandemic period. Trumello et al. (2021), for instance, indicated that perceived worsening of the father-child relationship predicted parenting stress. Essler et al. (2021) found that the quality of the parent-child relationship moderated the link from child well-being and problem behavior to parental strain. Furthermore, there were findings that fathers seem to be more prone to cascading *spillover effects* concerning family dynamics and well-being (Daks et al., 2022). Along with decrease of parental stress during the pandemic,

children improved regarding well-being and problem behavior (Essler et al., 2021). This underscores the importance of providing adequate support for fathers in the context of the pandemic, preventing the spread of symptoms and burden throughout different areas of their lives.

In light of the sparse, inconclusive, or incomplete findings regarding mental health and bonding quality of fathers of infants and toddlers at the time of the COVID-19 pandemic, study 3 provides valuable insights regarding their condition under these extraordinary circumstances. In addition, a comparison between mothers and fathers has been made. Further, it stands to reason that poorer parental mental health is likely to affect bonding quality as well. This supposed relationship was also shown in the maternal sample of study 2, which also enriches an apparently underrepresented research area by investigating this combination of variables. In both studies, maternal and paternal bonding was not only lower than before the pandemic (maternal bonding was only descriptively lower), it even deteriorated between the two measurement points. Furthermore, in study 1, maternal bonding was revealed to be significantly lower compared to before the pandemic. In this context, it is important to consider that the used measurement instrument (PBQ-16) is not validated yet and there are no cut-off values available (Reck et al., 2006). Therefore, a direct conclusion about the clinical extent regarding the impairment of bonding is not possible. In a study of parents of infants aged 0-6 months, van den Heuvel et al. (2022) pointed to the detrimental effects of the pandemic on the mental health and most likely on their parenting practices. Specifically, they measured stress in association with the pandemic and showed a relation to increased parental mental health symptoms and maternal insensitive parenting. In this context, the authors emphasized the possible subsequent adverse effects this has on the children's generation. In their systematic review and meta-analysis, Chmielewska et al. (2021) found elevated adverse maternal and pregnancy outcomes, such as stillbirth, maternal mortality and maternal depressive symptoms during the pandemic. They assumed that the pandemic-related lack of health-care might have had an influence, which is also relevant in the context of the findings on reduced access to the care system from study 1.

In the cross-sectional study 4, the aim was to investigate the prevalence of perceived stress and depressive symptoms in German students during the COVID-19 pandemic. Comparisons with pre-pandemic samples were used to examine the preregistered assumptions about the increase in depressive symptoms and perceived stress.
Results of study 4 showed the expected significantly increase (medium, close to large effect) of perceived stress in comparison to a pre-pandemic nonclinical sample (Schnei-

der et al., 2020). Also, compared to a clinical sample from the same study, a significant increase (small effect) could be seen. Elmer et al. (2020) likewise found elevated perceived stress in students during the pandemic. Depressive symptoms in the study 4 sample also increased significantly (medium, close to large effect) in comparison to a pre-pandemic student sample (Schlarb et al., 2017). Similarly, elevated depressive symptoms among students in the pandemic period were previously reported (Elmer et al., 2020; Holm-Hadulla et al., 2021; Yu et al., 2021).

The rate for cases scoring above the cut-off for a major depressive syndrome in the study 4 sample was with 63.3% surprisingly high. There were other studies reporting high rates during the pandemic by using the same measurement instrument (Barbosa-Camacho et al., 2022; Holm-Hadulla et al., 2021). Despite this and the fact that the used cut-off of the instrument (PHQ-9) only implies the presence of a major depressive syndrome and not the clinical diagnosis of a major depression, the group above the cut-off in study 4 was compared to a pre-pandemic subsample with diagnosed major depression (Gräfe et al., 2004). The mean was significantly lower (small, close to medium effect) than in the pre-pandemic subsample. The rate of students stating thoughts of "being better off dead" or hurting oneself (9.7%) was descriptively lower than the rate stated by Martínez-Líbano & Yeomans Cabrera (2021) regarding suicidal ideation and thoughts in university students during the pandemic (17.8%). Notably, for the rate of the study 4 sample, rather strict criteria were used.

In the study 4 sample 75.2% of the students indicated limiting of contacts due to the pandemic, over one half a decreasing number of friends and 65.7% more difficulties making contact with people. For 15%, friendships had become less important. This is relevant in the context of Reifman & Dunkel-Schetter (1990) who are reporting beneficial effects regarding depressive symptoms and perceived physical well-being if students had regular contact with other students. Barbosa-Camacho et al. (2022) reported a perceived worsening of performance in 80.8% of students with the change to online classes, 40.5% stating to have lower grades and 48.5% no difference (11% higher grades). Elevated depressive symptoms were related to decreased academic self-concept. This seems most relevant considering that in terms of study-related concerns (prolonged studying: 33.8%, learning less: 57.6%, not meeting requirements: 57.7%), the students in study 4 appear burdened. Further, 29.6% reported being able to acquire fewer ECTS credits under pandemic conditions (61.4% were able to earn the same, 9.0% more). Regarding perceived stress, Benham (2021), although it was not increased during the pandemic in this sample, indicated greater problems with sleeping and sleeping habits in relation to increased perceived stress. In the study 4 sample, also a lack of medical, psychotherapeutic, or other care due to the pandemic was reported by

35.5%.

In light of the worsened condition of students in study 4 during the time of the COVID-19 pandemic, it seems important to further investigate underlying mechanisms. The presented findings help highlight the extent of mental health deterioration in (German) students during the pandemic as an important step in implementing future prevention and support strategies.

It is relevant to mention that the reported high rate of students scoring above the cut-off for a major depressive syndrome is possibly influenced by the high sensitivity of the PHQ-9 (Gräfe et al., 2004; see also Weber et al., 2020). Moreover, besides applying a cut-off to continuously identify the cases of major depressive syndrome, there is also the possibility to investigate potential major depressive syndromes categorically, thus, if "5 or more of the 9 depressive symptom criteria have been present at least 'more than half the days' in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia" (Kroenke et al., 2001, p. 607; see also Löwe, Spitzer, et al., 2002). Arroll et al. (2010) commented that a score of 10 or more on the PHQ-9 identified cases of major depression more frequently than the categorical determination, assuming the latter as possibly too strict regarding clinical practice. In the investigation of the study 4 sample, a cut-off of 10 or higher is used to detect participants scoring in the range of a major depressive syndrome. Additionally, this allows to determine the level of severity (Kroenke et al., 2001; Löwe, Spitzer, et al., 2002). Holm-Hadulla et al. (2021) reported in addition to the 59.1% depressives syndromes in their sample also the rate that was calculated categorically, which turns out to be lower at 41.6%.

Summarizing, the 4 studies presented in this work allow a deeper insight concerning the condition of different (at-risk) populations during the pandemic. It became apparent that parents of infants and toddlers, mothers more than fathers, as well as students of higher education facilities seem to be noticeably burdened in the pandemic period. Maternal bonding might act as a protective factor, as well as partnership satisfaction. Regarding infant regulatory problems, prolonged sleep onset latencies and increased night awakenings appeared prominently. In the broader context, it is important to consider that vulnerability is influenced by a number of factors, such as socioeconomic status characteristics (e.g., employment or education status, see Xiong et al., 2020, Kowal et al., 2020). Furthermore, Kowal et al. (2020) found, for example, that married or cohabiting people exhibited less perceived stress during the pandemic. In any case, the COVID-19 pandemic pervasively affected the whole society, which is reflected in the populations that were investigated in this work.

6.2 Limitations

A general limitation is the fact that data collection was carried out solely via online survey, thus there has been no control for accompanying conditions, such as distraction or differences in the presentation on different devices. Further, generalizability is limited due to the high level of education and income in the CoviFam samples (study 1-3). In Addition, the parents are predominantly living together. Hence, it is important to address less well-off and/or single parents in future research. Aside from standardized measurement instruments, in all four studies a self-developed pandemic-specific questionnaire was used to capture necessary pandemic-related information. In some cases, also retrospective questions were used to assess the time of the greatest restrictions at the beginning of the pandemic. Comparisons to investigate a possible influence of the pandemic circumstances were only possible with pre-pandemic populations because of lacking unaffected control groups during the pandemic. Also, child age criteria (CoviFam) of the studies generally used for comparison are not always in line with the investigated age group. Regarding the variable of perceived stress used in CoviFam, many of the compared studies revert to parenting stress instead. The difference between the two constructs has already been set forth. In all four studies, perceived stress was assessed to employ a general concept of stress, considering the influence of pandemic-related stressors on individuals.

Moreover, the use of clinical interviews and/or behavioral observations instead of self-report questionnaires is preferable to derive reliable clinical information. The low-threshold (anonymous) online study designs did not support this. In the CoviFam samples, there was a relatively long survey period at the first measurement wave, in order to maximize sample size, although this could have led to a biasing effect. On the one hand, this impeded a sufficient control for potential effects of events that occurred during the survey period, although on the other hand, while the pandemic situation itself may be seen as a traumatic event (Kaubisch et al., 2022), the influence of other traumatic events and burdens independent of the pandemic generally cannot be excluded as alternative pathogenic factor and therefore should be investigated in further studies. Beyond that, it would be recommendable to analyze the data concerning careless responding patterns and to take the future use of prevention strategies into consideration (Ward & Meade, 2023).

In study 2, CLPMs were used to explore the role of bonding in the relationship between depressive symptoms and perceived stress. Using CLPMs can be considered as a methodological strength, but with only two measurement time points, analyses are facing limitations. Thereby, a distinction between within- and between-person effects is

not feasible (Lucas, 2022), which as a limitation could only be overcome by the already planned analysis of a third assessment.

It is important to note that the cross-sectional, but also the longitudinal analyses in this work do not allow drawing any kind of causal conclusions, hence conclusions regarding direct effects of the pandemic or lockdown periods should be interpreted very cautiously. In general, it has to be considered that there were different pandemic circumstances all over the world with global reactions depending on for example health care, economic, and cultural conditions (Tang et al., 2022). Therefore, the generalizability of the presented results is also limited.

In further analyses after completion of this work, it became apparent that data were included in the current analyses where participants might not have referred to the same child or partner at the different measurement times. This needs to be re-examined. However, initial analyses do not indicate any substantial changes in the results.

6.3 Conclusion, Clinical Implications and Future Research

The four presented empirical studies elucidated the condition of different populations in the context of the COVID-19 pandemic using various methods and study designs. It was shown that parental mental health, well-being and bonding quality deteriorated during the pandemic, in particular concerning mothers with an infant aged up to 1 year as well as fathers and mothers of infants and toddlers (0-3). In a gender comparison, mothers appeared of worse mental health (depressive symptoms and perceived stress), bonding quality showed equal levels. Maternal bonding (and relationship satisfaction) might act as a protective factor. Maternal burden seemed to be affected by having to care for young children and their siblings as well as an experienced lack of medical, psychotherapeutic, or other care. Concerning infant regulatory problems, sleeping problems appeared of importance in this context. In another phase of life, the period during studying (higher education facilities), the worsening of mental health in the time of the pandemic was revealed for a German sample of students, too, in particular regarding depressive symptoms and perceived stress.

In view of the findings reported, various measures in the preventive, clinical, psychosocial and medical context appear to be relevant. Strengthening intra-family relationships could be a first approach. The access to a sufficient health care system plays a role here,

also because a worsening in psychological well-being may translate into physical or social problems (Soejima, 2021). It is important that in times of such crisis, especially that with the greatest restrictions, such as closures of essential health care providers, new and more durable ways of care and support will be prepared. Chmielewska et al. (2021), regarding their findings on elevated adverse maternal and pregnancy outcomes, emphasize the importance of drawing consequences in the areas of research, health care and policymaking. Also, regarding child care, it is important to consider how reliable relief in crisis situations can be provided, especially when there is more than one child in the household. Finally, in light of the 35.5% students in study 4 who experienced a lack of medical, psychotherapeutic, or other care due to the pandemic, such kind of support is not to be underestimated, in particular considering the findings of Benatov et al. (2022) that student status predicted depressive symptoms, suicidal and self-harm thoughts.

A concept that could be of value is self-efficacy. For example, Liu et al. (2021) found, that higher levels of self-efficacy were related to higher bonding in mothers up to 6 months postpartum in the pandemic period. In addition, Lin et al. (2022) indicated that higher self-efficacy is linked to less parenting stress, mitigating pandemic-related stress as well as the influence of depressive symptoms. In their systematic review on self-efficacy and health-related outcomes of collective trauma, Luszczynska et al. (2009) reported associations between self-efficacy and general distress, the extent of posttraumatic stress symptoms and somatic health and emphasized the positive influence of self-efficacy in the context of readjustment following collective trauma. In this sense – besides its value in the clinical context – it would generally be worthwhile to include the concept of self-efficacy in future studies of protection and risk factors in the pandemic situation.

Regarding the findings of the possible protective role of maternal bonding and its influence on infant development (Le Bas et al., 2020), among others, maternal bonding could be the scope of preventive measures, as it is beneficial for the well-being of mothers at risk for depression and thus has a transgenerational effect. Intervention research rarely targets bonding as an outcome variable, but there are existing programs to foster parent-infant interaction or parental sensitivity, often using video feedback (O'Hara et al., 2019). In clinical practice, Video Intervention Therapy (VIT; Downing et al., 2014) in particular has turned out to be a valuable resource-oriented method to target dysfunctional patterns in parent-child interaction and to foster timely interactive repair, which is negatively associated to infant stress reactivity (Müller et al., 2015); see Reck et al. (2022) for an overview on how VIT might increase maternal responsiveness and self-efficacy. VIT is a valuable method to work with both mothers and fathers.

As already discussed, paternal bonding is less investigated than maternal bonding, as is paternal mental health, especially under pandemic circumstances. The findings in this work highlight that there should be a greater focus on fathers in research on relationship, family, and parenting dynamics.

Further, it would be relevant that traditional role stereotypes that fathers do not hold a significant place in motherhood would be questioned again in the context of the pandemic, as the circumstance of not being able to participate in examinations of their pregnant partners was reported by the fathers as having a negative influence on the psychological well-being of the expectant mothers (Andrews et al., 2022). Otherwise, fathers reported in this study that their increased participation in parenting tasks and responsibilities as a result of the structural changes during the pandemic were beneficial. Here could lay a promising approach for future research and prevention strategies in clinical practice. Brym et al. (2022), besides the finding that mothers showed more depressive symptoms than fathers during the pandemic, also indicated that the fathers showed higher levels of resilience than mothers. This may also be considered in future research designs. In light of the pandemic circumstances, the role of fathers should also be addressed in medical and psychosocial support for families with infants and toddlers.

The perspective on students at the time of the pandemic illustrates how important it is to support them sufficiently in such crisis situations and to create conditions in which learning and development are possible. This is also to be preventively considered in terms of tendencies of discontinuing the academic studies. In the study by Charbonnier et al. (2021) cited earlier, students exhibited more maladaptive strategies (e.g., self-blame) and less adaptive strategies (e.g., positive reframing) along with higher levels of depressive (and anxiety) symptoms during the pandemic. A foundation for providing appropriate support to students could be the conduction of regular low-threshold surveys at universities and/or departments in order to be able to conceive and respond to students' needs. Further, positive effects of mind/body interventions, physiological relaxation response induced by conscious exercises and cognitive behavioral techniques on psychological well-being and perceived stress of students were observed in a previous intervention study by Deckro et al. (2002). Future research should also associate the rate of university-dropouts with its analyses.

Tang et al. (2022) emphasized that it will be challenging or hardly possible to find a global, timely, and sufficient approach for how to respond to a *next pandemic* given the very different economic and political situations of different countries and areas of the world and the need to adapt the approach accordingly. The learning process of the

current pandemic is still ongoing. Even though many changes in the global pandemic situation have occurred in the meantime, the end has not yet been determined, which only the WHO can officially declare (Wadman, 2022). At the time of writing this work, they have not. In this context, Wadman (2022, p. 1078) cited an infectious disease epidemiologist from the University of Minnesota, Twin Cities: 'We are in totally uncharted territory from the perspective of understanding what a pandemic is, how it starts, how it unfolds, and how it ends' (Michael Osterholm).

Future research at various levels will make its contribution. Returning to the field of infant regulatory problems, it is conceivable that factors through which pandemic-specific psychosocial stressors influence infant regulatory problems may be revealed, such as maternal stress regulatory competence or adequate co-regulation. Furthermore, research on child attachment disorders or problems during the pandemic seems to be underrepresented. Regarding future research in the working group where the CoviFam and CoviStud studies were developed, further assessments and analyses are planned and/or ongoing. In the most recent survey of the CoviFam study, among other things, a stronger focus was placed on child development via the Ages and Stages Questionnaires (ASQ-3; Squires et al., 2009) as an outcome variable. For participants who are willing to further attend the study, assessments via telephone interviews are planned, including a short diagnostic interview on the parent side as well as an additional online assessment of further variables on the parent and child side. Beyond the CoviFam and the CoviStud studies, an investigation of clinical children and adolescents in the context of the COVID-19 pandemic was conducted (PAuCPa study; Psychische Auswirkungen der Corona-Pandemie; psychological impact of the coronavirus pandemic). The aim of this preregistered study was to examine a potential change of psychological symptoms during the pandemic in children and adolescents in general, and in particular for those who have experienced previous psychotrauma. In this context, parenting stress and parental relationship satisfaction were also assessed. In a multi-informant design, children or adolescents and their parents were surveyed, if possible, as well as psychotherapists.

Future analyses of the described assessments are intended to contribute to a better understanding of the condition of different (at-risk) populations at the time of the COVID-19 pandemic. With the findings of the present work, another step has been taken, adding to the basis for providing adequate support to families and students in crisis situations such as the COVID-19 pandemic.

German Summary – Zusammenfassung

Die COVID-19-Pandemie bewirkte eine globale, fundamentale und weitreichende Erschütterung des täglichen Lebens. Nach Entdeckung eines neuartigen Coronavirus, SARS-CoV-2, in China im Dezember 2019, erklärte die WHO am 11. März 2020 offiziell den Ausbruch einer Pandemie (WHO, 2023b). Anfang 2023 listete die WHO mehr als 656 Millionen Fälle und 6,6 Millionen Tote weltweit seit Beginn der Pandemie (WHO, 2023a). Durch die ergriffenen Maßnahmen zur Eindämmung des Virus, wie Quarantäne, Kontaktbeschränkungen, Schließungen von Schulen, Kinderbetreuung und öffentlichen Einrichtungen, Ausgangssperren, Maskenpflicht und vermehrtem Homeoffice wurde die Gesellschaft vor enorme Herausforderungen gestellt. Bald wurde offenbar, dass neben der körperlichen Bedrohung durch das Virus, die Pandemie auch als traumatisches Ereignis betrachtet und die psychische Gesundheit gefährdet werden kann (z.B. Brooks et al., 2020; Kaubisch et al., 2022; Kowal et al., 2020; Krishnamoorthy et al., 2020; Wu et al., 2021; Xiong et al., 2020). Ausgehend davon, dass unterschiedliche Populationen während der Pandemie auf verschiedene Weise von psychischen Problemen betroffen sind, wurden in dieser Arbeit ebenso unterschiedliche Populationen hinsichtlich psychischer Gesundheit und psychosozialer Beziehungen untersucht, die einige der während der Pandemie als Risikogruppen bezeichneten Gruppen (z.B. Kowal et al., 2020; Xiong et al., 2020) widerspiegeln. In vier verschiedenen empirischen Studien wurden kindliche Verhaltensauffälligkeiten (erstes Lebensjahr), das Befinden von Eltern von Babys und Kleinkindern (0-3 Jahre) und die Psychopathologie von Studierenden zur Zeit der Pandemie exploriert. Einige der adressierten Bereiche erscheinen angesichts der konstant anwachsenden Veröffentlichungen noch eher unterrepräsentiert. Die ersten drei Studien gehören zur CoviFam-Befragung (Fokus auf Familien), die letzte zur CoviStud-Befragung (Fokus auf Studierende). In beiden Fällen wurden die Daten durch Online-Befragungen erhoben.

Bevor man sich dem Befinden von Familien mit Babys und Kleinkindern während der Pandemie zuwendet, ist es essenziell, zuerst regulatorische Prozesse und frühe Regulationsprobleme im Kontext der Eltern-Kind-Beziehung der frühen Kindheit zu betrachten. Papoušek (2004) ging davon aus, dass Eltern intuitive Kompetenzen aufweisen, die es ihnen ermöglichen, kindliche Bedürfnisse zu erkennen und angemessen auf diese einzugehen. Unter Berücksichtigung der kindlichen Fähigkeiten in der Eltern-Kind-Interaktion kann so, zusammen mit den wiederum kindlichen positiven Reaktionen, ein individueller positiver regulatorischer Kreislauf entstehen. In diesem Kontext spielen frühkindliche Regulationsprobleme eine entscheidende Rolle. Für exzessives Schreien wurden Prävalenzen von 16,3 % in den ersten 3 Lebensmonaten, 5,8 % ab 3 Monaten und 2,5 % ab 6 Monaten angegeben (von Kries et al., 2006). In derselben Studie wurden Auffälligkeiten im Essverhalten für 1,4 % der Kinder im ersten Lebensjahr und etwa 3 % zwischen dem zweiten und vierten Lebensjahr verzeichnet. Im ersten Lebensjahr zeigten 12,9 % der Kinder auffälliges Schlafverhalten, das zum vierten Lebensjahr hin abnahm auf 1,4 %. Wenn Eltern die Erfahrung machen, ihr Kind nicht beruhigen zu können, oder es Auffälligkeiten im Schlaf-, Fütter- und Essverhalten zeigt, kann das dazu führen, dass sie sich in ihren elterlichen Kompetenzen geschwächt fühlen und nicht länger intuitiv reagieren, wie es bei Papoušek (2004) beschrieben ist. Auch eigene Bindungs- und Beziehungserfahrungen sind hier von Bedeutung. Wenn ungünstige Interaktionsmuster persistieren, kann das negative Auswirkungen auf die kindliche Entwicklung und die Eltern-Kind-Beziehung haben (Papoušek, 2004). Einen anderen wertvollen Einblick gewährt das Mutual Regulation Model (Tronick, 1989, 2003). Es geht davon aus, dass sich Bezugsperson und Kind durch emotionalen Austausch in einem gegenseitigen interaktionellen Prozess regulieren. Dabei wird die kindliche Entwicklung von der Korrektur interaktioneller "Fehler" beeinflusst. Psychische Probleme der Bezugspersonen wiederum können diese Fähigkeit beeinträchtigen (Tronick, 1989).
Der Übergang zur Elternschaft kann allgemein auch als kritisches Lebensereignis betrachtet werden (Epifanio et al., 2015), wobei Bonding (Beziehungserleben bzw. Verbundenheit mit dem Kind) eine zentrale Bedeutung einnimmt. Es konnte gezeigt werden, dass höhere mütterliche Bondingqualität einen günstigen Einfluss auf kindliche Entwicklung hat (Le Bas et al., 2022; Le Bas et al., 2020), niedrigere mütterliche Bondingqualität wurde jedoch mit vermehrten kindlichen Verhaltensauffälligkeiten assoziiert (Fuchs et al., 2016). Väterliches Bonding wurde bisher deutlich weniger untersucht, es gibt jedoch ebenso Befunde, dass z.B. eine beeinträchtigte Vater-Kind-Interaktion positiv mit kindlichen externalisierenden Verhaltensproblemen in Verbindung steht (Ramchandani et al., 2013) oder dass elterliches Bonding mit einem negativen indirekten Effekt über elterliche Belastung kindliche Probleme bezüglich exekutiver Funk-

tionen beeinflussen kann (de Cock et al., 2017). Im Kontext der reziproken Beziehung von depressiven Symptomen und erlebtem Stress (Hammen, 2005) konnte gezeigt werden, dass höhere mütterliche Bondingqualität eine protektive Funktion bei postpartal depressiven Müttern bzgl. elterlicher Belastung haben kann (Mason et al., 2011; Reck et al., 2016), auch wenn letztere vom Konzept generell erlebten Stresses differiert. In diesem Kontext kann auch Partnerschaftszufriedenheit als protektiv wirkend eingeschätzt werden (Fakhri et al., 2019). Hinsichtlich genderspezifischer Unterschiede bezüglich elterlichen Stresses und depressiver Symptomatik gibt es Hinweise auf mehr Stress (z.B. Hildingsson & Thomas, 2014; Pancer et al., 2000; Wang & Chen, 2006) als auch mehr depressive Symptomatik bei Müttern als bei Vätern (Vergleich der Raten erhoben mit der EPDS für Väter: Gawlik et al., 2013 und Kerstis et al., 2012; sowie für Mütter: Kerstis et al., 2012; Reck et al., 2008; von Ballestrem et al., 2005). Andere Studien zeigten keine Unterschiede hinsichtlich Stresses zwischen Müttern und Vätern (innerhalb der ersten 6 Monate; Gao et al., 2009; Mao et al., 2011; Seah & Morawska, 2016).

Der Blick auf Studierende vor Beginn der Pandemie lässt erkennen, dass die Lebensphase des Studierens eine anspruchsvolle Zeit mit vielen neuen Herausforderungen ist, die es zu bewältigen gilt (Weber et al., 2020). Dies kann die Vulnerabilität für die Entwicklung psychischer Erkrankungen verstärken. In diesem Zusammenhang berichteten Cavallo et al. (2016) mehr erlebten Stress und Rueckert & Ancane (2018) mehr depressive und Angstsymptomatik für Studierende im Vergleich zur Allgemeinbevölkerung. In weiteren Erhebungen mit Studierenden zeigte sich, dass depressive Symptomatik besonders häufig berichtet wurde (Auerbach et al., 2018; Bailer et al., 2008; Weber et al., 2020).

Mit der COVID-19-Pandemie haben sich die Lebensbedingungen für junge Familien und Studierende dramatisch verändert. Wie bereits erwähnt, können zusätzliche Stressoren die Transition zur Elternschaft empfindlich stören (Papoušek, 2004), was in der Zeit der Pandemie besonders bedeutsam erscheint. Da der Regulationsprozess auch von psychischen Problemen der Bezugspersonen beeinflusst werden kann (Tronick, 1989) und kindliche Entwicklung sowie Verhaltensauffälligkeiten von elterlichen psychischen Problemen und Bondingqualität oder der Qualität der Eltern-Kind-Beziehung beeinflusst werden können (z.B. Bronte-Tinkew et al., 2008; Fuchs et al., 2016; Le Bas et al., 2022; Le Bas et al., 2020; Ramchandani et al., 2008), ist es von besonderer Relevanz, das psychische Befinden und die Bondingqualität von Eltern von Babys und Kleinkindern während der Pandemie zu betrachten. Ebenso darf eine Betrachtung der vulnerablen Gruppe von Studierenden in der Zeit der Pandemie (Xiong et al., 2020) nicht außer Acht gelassen werden.

Es wurden nachteilige Effekte der Pandemie auf Familiensysteme angenommen (Eales et al., 2021; Gadermann et al., 2021; Prime et al., 2020; Soejima, 2021). Prime et al. (2020) nahmen nachhaltige und durchdringende Auswirkungen auf die sozialen Gesellschaftsstrukturen an, mit Risiken auf verschiedenen Ebenen, die wiederum einen Folgekreislauf an Problemen auslösen können. Herausfordernde Veränderungen des Familienlebens, potentielle belastungsinduzierte psychische Problematiken auf Seite der Bezugspersonen und daraus möglicherweise folgende Beeinträchtigung von elterlichen Fähigkeiten können die Eltern-Kind-Beziehung beeinträchtigen und folglich die kindliche Fähigkeit, sich an die veränderten Bedingungen anpassen zu können. Dieser Prozess wiederum wird von den protektiven und Risikofaktoren, Vulnerabilitäten und Benachteiligungen beeinflusst, die ein Familiensystem mit sich bringt. Diese Überlegungen werden im gravierendsten Sinne untermauert von Berichten über das vermehrte Vorkommen von Partnerschaftsgewalt und Kindesmissbrauch und -vernachlässigung während der Pandemie (Soejima, 2021; Verger et al., 2021).

Studien, die sich mit Bondingqualität oder Eltern-Kind-Beziehung während der Pandemie beschäftigen sind immer noch rar und die Ergebnisse uneindeutig, so wurde von einer Verschlechterung mütterlichen Bondings (D. V. Fernandes et al., 2021a; Suzuki, 2022) und beeinträchtigtem initialen väterlichen Bonding (Andrews et al., 2022) berichtet, ebenso von stabilem mütterlichen Bonding (Layton et al., 2021) oder einer Verbesserung der Vater-Kind-Beziehung (J. Hu et al., 2022; Weissbourd et al., 2020). Weiter wurde ein Anstieg depressiver Symptome für Mütter berichtet (z.B. Davenport et al., 2020; Fallon et al., 2021; Racine et al., 2022; Safi-Keykaleh et al., 2022), ebenso für Eltern im Allgemeinen (Syed et al., 2022; Zou et al., 2022). Es gab jedoch auch Berichte über ausbleibende Erhöhung der mütterlichen depressiven Symptomatik (D. V. Fernandes et al., 2021a; Suzuki, 2022) oder eine Verringerung selbiger für Väter (van den Heuvel et al., 2022). Erlebter Stress für Mütter (Suárez-Rico et al., 2021) und elterliche Belastung für Väter (Taubman-Ben-Ari et al., 2021) wurde als erhöht berichtet. Längsschnittstudien lassen häufig das Muster erkennen, dass sich elterliches Befinden in den Perioden mit strengeren pandemiebedingten Maßnahmen verschlechtert (z.B. D. V. Fernandes et al., 2021b; J. Fernandes et al., 2022; Gordon-Hacker et al., 2022; M. S. Johnson et al., 2021; Woll, 2022).

Kindliche Regulationsprobleme wurden während der Pandemie in einigen Studien als erhöht angegeben (z.B. Buechel et al., 2022; Perez et al., 2021; Reinelt et al., 2022), wenn auch nicht immer in allen Bereichen (Schreien, Schlafen, Füttern/Essen). Auch ältere Kinder und Jugendliche erschienen als im Kontext der Pandemie von psychischen Problemen betroffen (z.B. Cost et al., 2022; Kauhanen et al., 2022; Panda et al., 2021; Ravens-Sieberer et al., 2022; Waite et al., 2021).

Für Studierende zeichnete sich zur Zeit der Pandemie mit der Umstellung auf Online-Lehre oder auch von Prüfungsformen (Diel et al., 2021) – zusätzlich zu den allgemeinen Begleitmaßnahmen – häufig eine Verschlechterung der psychischen Gesundheit ab. So wurde etwa ein Anstieg von depressiver und Angstsymptomatik, erlebten Stresses und Einsamkeit berichtet (z.B. Elmer et al., 2020; Holm-Hadulla et al., 2021; Yu et al., 2021), auch wenn andererseits von verringerten Stresslevels (Benham, 2021) oder positiven Entwicklungen hinsichtlich Konkurrenzverhalten oder *Fear of Missing Out* berichtet wird (Elmer et al., 2020). Dass Studierende während der Pandemie als eine besonders vulnerable Gruppe gesehen werden können, wird durch den Befund unterstrichen, dass Studierendenstatus Suizid- und Selbstverletzungsgedanken prädizierte (Benatov et al., 2022).

Dies kann auch im Sinne des Diathese-Stress-Modells gesehen werden (Broerman, 2020; Petermann et al., 2018). Hier wird davon ausgegangen, dass psychopathologische Entwicklung vom Zusammenspiel von Vulnerabilität und lebensereignisspezifischen Stressoren abhängt. In diesem Fall könnte der Studierendenstatus an sich als Risikofaktor gesehen werden und zusammen mit zusätzlichen pandemiespezifischen Stressoren können (weitere) Schwellenwerte überschritten werden, was zur Ausprägung von Psychopathologie führen kann.

Die empirischen Studien, die in dieser Arbeit vorgestellt wurden, leiten sich aus den behandelten Themen und Modellen ab. In Querschnittsstudie 1 wurden kindliche Verhaltensauffälligkeiten im ersten Lebensjahr und die damit einhergehenden Belastung der Mütter während der Pandemie untersucht, inklusive der Zeit der stärksten Beschränkungen, mit 577 Müttern aus Deutschland und Österreich. Außerdem wurde mütterliche depressive Symptomatik und erlebter Stress exploriert, sowie Bondingqualität und Partnerschaftszufriedenheit. Es zeigte sich ein erhöhtes Risiko für eine depressive Episode bei 33,3 % der Mütter, was sich in Ergebnisse von Ceulemans et al. (2021) einreiht; höheres Stresserleben im Vergleich zu vor der Pandemie schließt an Befunde von Kowal et al. (2020) an. Bezüglich kindlicher Regulationsprobleme zeigten 21,7 % der Kinder verlängerte Einschlaflatenzen und/oder vermehrten Durchschlafschwierigkeiten, ähnlich wie in Berichten von Zreik et al. (2021), Perez et al. (2021) und Markovic et al. (2021). Eine geringe Prävalenz zeigte sich hinsichtlich exzessiven Schreiens oder Fütter- und Essproblemen in Studie 1. Insgesamt schließt das teilweise an andere veröffentlichte Befunde an (Buechel et al., 2022; Perez et al., 2021; Reinelt et al., 2022). Eine hohe Belastung durch Schreien/Quengeln oder Schlafverhalten der Kinder wurde von jeweils 28,7 % und 19,3 % der Mütter berichtet (8,9 % bzgl. der Belastung durch Fütter- und Essverhalten). Es wurde ein Zusammenhang zwischen

berichteter Belastung durch Schreien und Schlafverhalten und vermehrtem Stresserleben, aber nicht hinsichtlich depressiver Symptome gefunden. Im Zusammenhang mit Bonding und Partnerschaftszufriedenheit berichteten die Mütter weniger Belastung. Höhere Belastung durch das kindliche Verhalten wurde von Müttern berichtet, die ein Geschwisterkind im Haushalt hatten, wenn sie einen Mangel an medizinischer, psychotherapeutischer oder sonstiger Versorgung erlebten oder wenn sie berichteten, dass ihr Kind vermehrt schrie oder lange brauchte, um einzuschlafen. Darüber hinaus stieg die Belastung durch das Schrei-, Schlaf-, Fütter- und Essverhalten ebenso wie das Ausmaß der Beeinträchtigung des Bondings mit dem Alter des Kindes. Als präventive Maßnahmen im Kontext der Pandemie sollten innerfamiliäre Beziehungen gestärkt, Mutter-Kind-spezifische Versorgung sichergestellt und es sollte hinsichtlich der Versorgung von Geschwisterkindern entlastet werden. Im Rahmen der englischen Adaption der bereits veröffentlichten Studie 1 für die vorliegende Arbeit fand auch eine differenzierte Auseinandersetzung mit und Darstellung von der im englischen Sprachgebrauch empfohlenen Terminologie hinsichtlich früher Regulationsprobleme statt.

In Längsschnittstudie 2 (zwei Messzeitpunkte) wurde die Rolle von mütterlichem Bonding im Zusammenhang von depressiven Symptomen und erlebtem Stress während der Pandemie bei 666 Müttern aus Deutschland von 0-3-jährigen Kindern untersucht. Verglichen mit einer vorpandemischen Stichprobe gesunder und klinisch depressiver Mütter (Reck et al., 2006), zeigten die Mütter geringere Bondingqualität, wie es auch in anderen nicht-klinischen Gruppen gezeigt wurde (D. V. Fernandes et al., 2021a; Suzuki, 2022). Die Mütter aus Studie 2 zeigten außerdem eine Verschlechterung des Bondings im Längsschnitt. Insgesamt waren depressive Symptome und erlebter Stress auch erhöht und verschlechterten sich im Verlauf, was mit stärkeren Pandemie-Restriktionen zum späteren Messezeitpunkt zusammenhängen könnte (siehe Woll, 2022; ebenso Ceulemans et al., 2021). Vermehrte mütterliche depressive Symptome und Stress während der Pandemie wurden bereits berichtet (z.B. Chmielewska et al., 2021; Racine et al., 2022; Safi-Keykaleh et al., 2022; Suárez-Rico et al., 2021). Es wurden signifikante reziproke Prädiktionen zwischen depressiven Symptomen und erlebtem Stress in der Stichprobe der Studie 2 gefunden. CLPMs wiesen auf einen mediierenden Effekt von Bonding hin und bestätigten diesen. Weitere Mediations- und Moderationsanalysen zeigten einen kleinen partiellen mediierenden und einen kleinen moderierenden Effekt von Bonding. Es konnte gezeigt werden, dass ein Teil des negativen Langzeiteffekts mütterlicher depressiver Symptome auf erlebten Stress über geringere Bondingqualität vermittelt wird, außerdem, dass je höher die Beeinträchtigung des Bondings, desto schwächer der Zusammenhang zwischen depressiven Symptomen und erlebtem Stress. Der positive Zusammenhang zwischen Bonding und erlebtem Stress in der Stichprobe der

Studie 2 lässt eine potenziell protektive Rolle von höherer Bondingqualität bezüglich mütterlicher psychischer Gesundheit zur Zeit der Pandemie annehmen. Angesichts des Einflusses von mütterlichem Bonding auf die kindliche Entwicklung (Le Bas et al., 2020) könnte es sinnvoll sein, in der Prävention bezüglich psychologischer Gesundheit für Mütter mit Risiko für eine Depression darauf einen Fokus zu legen.
In Studie 3 wurden erlebter Stress, depressive Symptome und Bondingqualität von 173 Vätern aus Deutschland von Babys und Kleinkindern (0-3 Jahre) während der Pandemie im Quer- und Längsschnitt (zwei Messezeitpunkte) untersucht, ebenso Geschlechterunterschiede bezüglich dieser Variablen durch einen Vergleich mit den Müttern innerhalb von Paaren. Väterliche depressive Symptome zeigten sich zum ersten Zeitpunkt signifikant erhöht im Vergleich zu vor der Pandemie, gleichermaßen die Rate von Vätern, die über dem Cut-off bezüglich des Risikos zur Entwicklung einer Depression lagen (19,1 %). Erhöhte depressive Symptome wurden für Väter in der Pandemie bereits gezeigt (Syed et al., 2022; Zou et al., 2022). Erlebter Stress war ebenso signifikant erhöht bei den Vätern in Studie 3, ähnlich wie bei Taubman-Ben-Ari et al. (2021). Väterliches Bonding verschlechterte sich in Studie 3 signifikant im Vergleich zu vor der Pandemie, was an Ergebnisse von Andrews et al. (2022) anschließt. Über den Verlauf der Pandemie blieben väterliche depressive Symptome und erlebter Stress stabil, Bonding verschlechterte sich. Frühere Befunde deuten auf eine größere Belastung der Mütter während der Pandemie hin (z.B. Aguiar et al., 2021; Bıkmazer et al., 2021; Chung et al., 2020). In Studie 3 zeigte der Geschlechtervergleich zum ersten Messzeitpunkt signifikant weniger depressive Symptome und erlebten Stress für Väter, aber ähnliche Bonding-Werte. Wenn auch weniger belastet als Mütter zur Zeit der Pandemie, sollten Väter in Anbetracht der beobachteten anhaltenden Verschlechterung hinsichtlich psychischer Gesundheit und Bonding im Vergleich zu vor der Pandemie sowohl in zukünftiger Forschung, als auch in der Unterstützung von Familien mit jungen Kindern Beachtung finden.
In Querschnittsstudie 4 wurde die Prävalenz von erlebtem Stress und depressiven Symptomen bei 2960 Studierenden aus Deutschland während der Pandemie untersucht, wobei der hypothetisierte Anstieg der Symptomatik über den Vergleich mit vorpandemischen Stichproben exploriert wurde. Erlebter Stress zeigte sich als signifikant erhöht im Vergleich zu vor der Pandemie, was sich in Ergebnisse von Elmer et al. (2020) einreiht. Auch depressive Symptome präsentierten sich signifikant erhöht, was sich auch in anderen Ergebnissen widerspiegelt (Elmer et al., 2020; Holm-Hadulla et al., 2021; Yu et al., 2021). Die Rate für ein Major Depressives Syndrom unter den Studierenden in Studie 4 war mit 63,3 % unerwartet hoch. Auch wenn der verwendete Cut-off nur das Vorhandensein eines Major Depressiven Syndroms und nicht die klinische Diagno-

se einer Major Depression impliziert, wurde die Gruppe über dem Cut-off in Studie 4 mit einer präpandemischen Gruppe mit diagnostizierter Major Depression verglichen und zeigte signifikant weniger depressive Symptome. Die dargestellten Ergebnisse heben Studierende während der Pandemie als vulnerable Gruppe hervor. Angemessene Unterstützung für Studierende in derartigen Krisensituationen ist unabdingbar, vorstellbar etwa über regelmäßige niederschwellige Umfragen an Universitäten oder Departements, um deren Bedürfnisse erfassen und darauf reagieren zu können.

Generelle Limitationen hinsichtlich der durchgeführten Studien zeigen sich etwa in der eingeschränkten Generalisierbarkeit durch das hohe Level an Bildung, Einkommen und die überwiegend zusammenlebenden Eltern in den CoviFam-Stichproben. Neben dem Einsatz eines selbst entwickelten Fragebogens, um notwendige pandemiebezogene Informationen zu erhalten, wurden ausschließlich Fragebögen in Selbstauskunft durch Online-Befragungen erhoben. Um reliable klinische Daten zu erhalten, wäre der Gebrauch von klinischen Interviews und/oder Verhaltensbeobachtungen zu bevorzugen, was allerdings mit solch niederschwelligen Online-Designs wie den vorgestellten nicht vereinbar war. Es ist zu betonen, dass die Querschnitts-, aber auch die Längsschnittanalysen in dieser Arbeit keine Art von kausalen Schlüssen zulassen, sodass Schlussfolgerungen bezüglich direkter Effekte der Pandemie oder von Lockdownperioden mit Vorsicht interpretiert werden sollten. Im Allgemeinen muss berücksichtigt werden, dass es weltweit unterschiedliche pandemische Umstände mit globalen Reaktionen abhängig von beispielsweise wirtschaftlichen und kulturellen Bedingungen, sowie denen der Gesundheitsfürsorge gab (Tang et al., 2022), was die Generalisierung der dargestellten Ergebnisse einschränkt.

Die vorgestellten Befunde dieser Arbeit zeigten eine Verschlechterung verschiedener Aspekte der untersuchten (Risiko-) Populationen, aber auch mögliche Protektivfaktoren. Dies trägt zu einem besseren Verständnis von deren Befinden während einer solchen Ausnahmesituation wie der COVID-19-Pandemie bei. Ein Hintergrund an empirischer Forschung kann die Entwicklung und Bereitstellung adäquater Unterstützung für Familien und Studierende verbessern, wozu die vorliegende Arbeit weitere Erkenntnisse ergänzt.

Appendix A

Previously Published Study 1 – Article

Studie

Kindliche Verhaltensauffälligkeiten im ersten Lebensjahr und mütterliche Belastung in der Zeit der COVID-19-Pandemie

Ergebnisse aus der Online-Befragung „CoviFam“

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Zusammenfassung: *Theoretischer Hintergrund:* Die COVID-19-Pandemie stellte in vielen Bereichen eine Belastung für Familien dar, insbesondere durch die einschneidenden Beschränkungen zu Beginn. *Fragestellung:* Wie wirkte sich dies auf die Belastung von Müttern mit Kindern im ersten Lebensjahr und auf die kindliche Verhaltensregulation aus? *Methode:* In einer Online-Befragung schätzten 577 Mütter das Schrei-, Schlaf- und Fütter-/Essverhalten ihrer Kinder (M = 7.3; 0 – 12 Mon., SD = 3.25) und ihre eigene Belastung ein, zudem Stresserleben, depressive Symptomatik, Partnerschaftszufriedenheit und Bonding. *Ergebnisse:* Schlafprobleme traten bei 21.7 %, schwer tröstbares und häufiges Schreien bei 12.3 % und exzessives Schreien bei 1.6 % der Kinder auf. Mindestens jede fünfte Mutter fühlte sich durch Schreien oder Schlafprobleme belastet. Mehr Stress, beeinträchtigtes Bonding und weniger Partnerschaftszufriedenheit erklärten 17 – 21 % der Varianz der mütterlichen Belastung durch Schrei- und Schlafverhalten. In der Zeit der stärksten Beschränkungen zeigte sich signifikant mehr Belastung in der Gruppe von Müttern, die von vermehrtem Schreien und verlängerter Einschlaflatenz berichteten, sowie mit mindestens einem weiteren Kind im Haushalt (MANOVA). *Diskussion und Schlussfolgerung:* Pandemiebedingt belastend für Mütter im ersten Jahr scheinen eingeschränkter Zugang zum Versorgungssystem, die Betreuung von mehr als einem Kind sowie das Alter des Kindes zu sein, während eine gute Beziehung zum Kind (Bonding) und/oder zum Partner (Partnerschaftszufriedenheit) abmildernd wirken.

Schlüsselwörter: COVID-19-Pandemie, Schreien, Schlafen, Füttern, Regulationsprobleme, mütterliche Belastung, Stress, erstes Lebensjahr, Bonding, Partnerschaftszufriedenheit

Infant Behavioral Problems in the First Year of Life and Maternal Stress During the COVID-19 Pandemic: Results from the “CoviFam” Online Survey

Abstract: *Theoretical background:* The COVID-19 pandemic placed a burden on families in several respects, particularly because of the severe confinement imposed at its beginning. The confinement in spring 2020 led to social disruption and a reduction of supportive structures. In the first year of an infant’s life, the psychological well-being of a mother–child dyad is particularly susceptible to external stressful changes. *Research question:* How did the restrictions from the pandemic affect families with children in the first year of the infant’s life, particularly infant regulatory problems and related maternal stress? *Methods:* In an online survey, N = 577 mothers reported on their infants’ behavior (0 – 12 months of age, M = 7.3 months, SD = 3.3) regarding their crying, sleeping, and feeding/eating behavior as well as the respective distress experienced during the restrictions. Measures of current maternal well-being included overall perceived stress, depressivity, relationship satisfaction, and maternal bonding. Frequency/duration of infantile crying, sleep latency as well as night awakenings and feeding/eating problems were surveyed following clinical criteria (DC: 0 – 5) and percentile scores, respectively. The association of infant behavior and maternal distress was examined using linear regression and MANOVA. *Results:* Overall, at least one in five mothers felt burdened by her child’s regulatory problems during the time of severe restrictions. More than one in four mothers reported being highly or very highly distressed by her child’s crying. Sleeping problems, such as prolonged sleep latency (> 90th percentile) or several

nightly awakenings, were reported for 21.7 % of the children. Difficulty to console and frequent crying were reported for 12.3 % and excessive crying for 1.6 % of the children. Higher levels of stress as well as increased impairment in maternal bonding and less relationship satisfaction explained 17 – 21 % of the variance of maternal distress from crying and sleeping problems. Significantly more distress was evident in the group of mothers who reported increased crying and prolonged latency to fall asleep (> 45 min) and with more than one child in the household during the period of most severe restrictions (MANOVA). A lack of medical, psychotherapeutic, and other means of care was reported by nearly a quarter of the respondents and was the only restriction that was significantly related to the perception of more stressful child behavior. *Discussion and conclusion:* Pandemic-related stressors for first-year mothers appear to be enhanced by limited access to the care system, caring for more than one child, the increasing age of the child, while a good relationship with the child (bonding) and/or partner (relationship) satisfaction provide buffers.

Keywords: COVID-19 pandemic, crying, sleeping, feeding, regulation problems, maternal stress, infancy, bonding, relationship satisfaction

Die COVID-19-Pandemie beeinträchtigt das psychische Wohlbefinden von Kindern und ihrer ganzen Familie in mehrfacher Hinsicht. Die einschneidenden Maßnahmen zur Beschränkung von Kontakten zu Beginn der Pandemie können nach dem Risiko- und Resilienz-Modell in der COVID-19-Pandemie von Prime, Wade & Browne (2020) eine Kaskade von Folgeproblemen anstoßen. Insbesondere soziale Veränderungen – Isolation, veränderte Routinen, Kurzarbeit, Homeoffice, Wegfall familiärer bzw. externer Kinderbetreuung, Mangel an professioneller Unterstützung, z. B. bei praktischen Fragen zum Stillen (Vazquez-Vazquez, Dib, Rougeaux, Wells & Fewtrell, 2021) – können zu einem geringeren familiären Wohlbefinden führen (mehr „Chaos“ in der Familie: Johnson, Martin, Partika, Phillips, Castle & the Tulsa SEED Study Team, 2021; erhöhte depressive und ängstliche Symptomatik, vermehrter Stress: z. B. Ceulemans et al., 2021). So wird das gesamte Familiensystem belastet, was sich negativ auf die elterliche Fähigkeit zur Co-Regulation von kindlichem Stress und Affekt auswirken kann. Die Folge kann ein Teufelskreis sein, bei dem die Kinder vermehrt Probleme in der Regulation zeigen und Eltern zusehends das Vertrauen in die eigenen elterlichen Fähigkeiten verlieren und dysfunktionale oder weniger Beruhigungsversuche unternehmen (Modell der wechselseitigen Regulation nach Papoušek, 2004).

In diesem Kontext zeigen sich frühe kindliche Verhaltensauffälligkeiten oft in den Bereichen Schreien, Schlafen und Füttern und prädizieren psychische Probleme oder abweichende Entwicklungsverläufe im späteren Kindesalter (Schmid, Schreier, Meyer & Wolke, 2010). Mütterliche psychosoziale Belastung und erhöhtes Stresserleben prädizieren vermehrte Probleme in der emotionalen und Verhaltensregulation der Säuglinge (Schmid, Schreier, Meyer & Wolke, 2011).

Ziel dieser explorativen Studie war die Erfassung der Lebenssituation junger Familien während der Pandemie inklusive der Zeit der stärksten Beschränkungen, mit Schwerpunkt auf möglichen Auffälligkeiten im Schrei-, Schlaf- und Fütter-/Essverhalten bei den Kindern und der damit einhergehenden Belastung ihrer Mütter. Außerdem wurden Depressivität und Stresserleben bei den Müttern erhoben, da sie in enger Wechselwirkung mit der Entstehung früher Regulationsprobleme stehen. Erhoben wurden auch Bonding (mütterliches Beziehungserleben bzw. Verbundenheit mit dem Kind) und Partnerschaftszufriedenheit als potentiell protektive Faktoren für die Entstehung von Stress in der frühen Elternschaft (z. B. Reck, Zietlow, Müller & Dubber, 2016; Fakhri, Hasanpoor-Azghady, Farahani & Haghani, 2019). Die von uns postulierten Hypothesen waren dabei, dass sowohl kindliche Verhaltensauffälligkeiten im ersten Lebensjahr in der Zeit der COVID-19-Pandemie verstärkt auftreten, als auch dass die grundsätzliche Belastung der Mütter (Depressivität, Stresserleben) erhöht ist, und dass dies miteinander in Beziehung steht.

Methoden

Rekrutierung und Stichprobe

Die vorliegende Stichprobe stammt aus einer anonymen Online-Befragung von insgesamt 1935 Bezugspersonen von Kindern im Alter von 0 – 3 Jahren zu den Auswirkungen der COVID-19-Pandemie. Die Studie wurde an den Standorten München und Heidelberg durchgeführt. Erreicht wurden die Eltern überwiegend über pädiatrische und gynäkologische Praxen, Geburtskliniken und Hebammennetzwerke sowie soziale Medien. Die Ethikkommission der Medizinischen Fakultät der Universität Heidelberg hat in Übereinstimmung mit der Ludwig-Maximilians-Universität München die Studie als unbedenklich bewertet (Votum: S-446/2017). Im Zeitraum von Juli bis November 2020 nahmen 577 Mütter aus Deutschland und Österreich mit Kindern im Alter bis 12 Monate teil. Die Bedingungen des ersten Lockdowns waren in beiden Ländern ähnlich (Beginn ab März 2020, Ausgangs- und Kontaktbeschränkungen, Maskenpflicht, Quarantäneregeln, schrittweise Lockerung ab Ostern). Die Mütter waren zwischen 19 und 44 Jahre alt (M = 31.77, SD = 4.0; n = 23 ohne Angabe), die Kinder im ersten Lebensjahr (M = 7.26 Monate, SD = 3.25, 0 – 12 Monate; 52.3 % männlich).

In 44.3% der Haushalte lebte mindestens ein weiteres Kind. Die Mütter waren überdurchschnittlich gut gebildet: 66.6% hatten Abitur, 16.1% Fachhochschulreife, 15.6% mittlere Reife, 1.6% Hauptschulabschluss und 0.2% hatten keinen Abschluss. Die Eltern der Kinder lebten überwiegend zusammen (97.2%). Die Mehrzahl der Mütter (60.0%) befand sich zum Zeitpunkt der Erhebung in Elternzeit. Von den Müttern, die nicht in Elternzeit/Mutterschutz waren, hatten 29.0% einen systemrelevanten Beruf.

Erhebungsinstrumente

Um kindliche Verhaltensauffälligkeiten und die damit einhergehende Belastung für die Zeit der stärksten Beschränkungen durch die Pandemie zu erfassen, wurden in einem von der Arbeitsgruppe selbst entwickelten Fragebogen (Reck et al., 2020, unveröffentlicht; für einen Auszug der verwendeten Items siehe Elektronisches Supplement 1) diesbezügliche Fragen retrospektiv für diesen Zeitraum gestellt. Ausgenommen waren dabei die Fragen zum exzessiven Schreien. Auch Fragen zu Veränderungen der familiären Lebenssituation und Sorgen um das Kind wurden zum Teil retrospektiv erhoben. Das psychische Befinden, Bonding und Partnerschaftserleben wurden für den Zeitraum erfragt, für den die Fragebögen entwickelt wurden, um die Validität der Messinstrumente nicht einzuschränken.

Kindliches Verhalten und assoziierte mütterliche Belastung

Kindliches Verhalten in den Bereichen Schreien, Schlafen, Füttern/Essen wurde sowohl mit offenen als auch geschlossenen Fragen erfasst, angelehnt an die Störungskategorien der DC:0–5 (ZERO TO THREE, 2016). Laut der 3er-Regel nach Wessel (Wessel, Cobb, Jackson, Harris & Detwiler, 1954), die von der DC:0–5 als Beschreibung für eine „Exzessive Schreistörung" adaptiert wurde, gilt Schreien als exzessiv, wenn es länger als 3 Stunden pro Tag (24 h), häufiger als 3 Tage in der Woche und länger als 3 Wochen anhält. Da kindliches Schreien auch bei geringerer Dauer belastend sein kann, wurde zusätzlich gefragt, ob das Kind sehr häufig schreit und sich schwer trösten lässt oder häufig aufgebracht ist. Außerdem wurde retrospektiv erfragt, ob das Kind zur Zeit der stärksten Beschränkungen vermehrt schrie, weinte oder quengelte (1 = *gar nicht* bis 5 = *sehr*).

Das Einschlafverhalten wurde als auffällig definiert (> 90. Perzentil; Paavonen et al., 2020), wenn das Kind länger als 90 Minuten (ab drei bis sechs Monaten), länger als 60 Minuten (ab sechs bis acht Monaten) und länger als 45 Minuten (ab acht Monaten) brauchte, um einzuschlafen. Durchschlafprobleme (> dreimal pro Nacht/> 30 Minuten) entsprechen den Kriterien einer „Durchschlafstörung" der DC:0–5 (ZERO TO THREE, 2016) ab einem Alter von acht Monaten. Zusätzlich wurde erfragt, ob das Kind zur Zeit der stärksten Beschränkungen länger brauchte, um einzuschlafen und ob es häufiger nachts wach wurde (1 = *gar nicht* bis 5 = *sehr*).

Schwierigkeiten beim Füttern/Essen wurden in Anlehnung an das A-Kriterium der „Störung mit Vermeidung oder Einschränkung der Nahrungsaufnahme" des DSM-5 (Falkai & Wittchen, 2014) erfragt, nämlich inwieweit das Kind zur Zeit der stärksten Beschränkungen eingeschränkter aß, sich weniger gut füttern ließ, häufiger das Essen vermied oder mehr Sensibilität dem Essen gegenüber zeigte (jeweils 1 = *gar nicht* bis 5 = *sehr*).

Daneben wurde – ebenfalls für die Zeit der stärksten Beschränkungen – erfragt, wie stark sich die Mütter durch das kindliche Verhalten (Schrei-, Schlaf- und Fütter-/Essverhalten) belastet fühlten, unabhängig von der Dauer oder Intensität des Verhaltens.

Mütterliche Depressivität und Stresserleben

Mütterliche Depressivität wurde mit der deutschen Version der *Edinburgh Postnatal Depression Scale* (EPDS; Bergant, Nguyen, Heim, Ulmer & Dapunt, 1998) erfasst. Diese ermöglicht die Selbsteinschätzung von Symptomen einer postpartalen Depression (bei ≥ 10 Risiko einer minoren depressiven Episode, bei ≥ 13 Risiko einer majoren depressiven Episode) über zehn Items mit vier Antwortmöglichkeiten (Schweregrad 0–3). In der vorliegenden Stichprobe war Cronbachs α = .87.

Mit der *Perceived Stress Scale* (PSS-10; Reis, Lehr, Heber & Ebert, 2019) wurde das Stresserleben (Unkontrollierbarkeit, Unvorhersehbarkeit, Überforderung angesichts der eigenen Bewältigungsfähigkeiten) mit zehn Items auf einer 5-stufigen Likert-Skala (0 = *nie* bis 4 = *sehr oft*) erhoben. Höhere Summenwerte bedeuten ein erhöhtes Stresslevel. In der vorliegenden Stichprobe war Cronbachs α = .87.

Bonding

Das Bonding zum Kind wurde mit der deutschen gekürzten Version des *Postpartum Bonding Questionnaire* erfasst (PBQ, Brockington et al. 2001; PBQ-16, Reck et al. 2006). Insgesamt 16 Aussagen bzgl. des mütterlichen Beziehungserlebens zum Kind werden auf einer 6-stufigen Likert-Skala (0 = *immer* bis 5 = *nie*) beantwortet. Höhere Punktwerte zeigen eine stärkere Beeinträchtigung des Bondings an. In der vorliegenden Stichprobe war Cronbachs α = .85.

Partnerschaftszufriedenheit

Die Partnerschaftszufriedenheit wurde mit der Kurzform des Partnerschaftsfragebogens erfasst (PFB-K; Kliem et al, 2012). Insgesamt werden neun Aussagen zu Verhaltensweisen des Partners auf einer 4-stufigen Likert-Skala eingeschätzt (0 = *nie/sehr selten* bis 3 = *sehr oft*). Das zehnte Item fragt nach dem in der Beziehung empfundenen Glück (0 = *sehr unglücklich* bis 5 = *sehr glücklich*). Der PFB-K hatte in dieser Stichprobe ein Cronbachs α = .85.

Statistische Analysen

Die Veränderungen der familiären Lebenssituation durch die pandemiespezifischen Beschränkungen, die Angaben zum kindlichen Verhalten und die Häufigkeiten der kindlichen Verhaltensauffälligkeiten in Anlehnung an die klinischen Kriterien sowie die Belastungen der Mutter durch das Schrei-, Schlaf- und Fütter-/Essverhalten des Kindes werden zunächst deskriptiv dargestellt. Die Interkorrelationen der mütterlichen Belastungen und kindlichen Verhaltensweisen wurden mit bivariaten Korrelationen nach Pearson berechnet. Mittels Einstichprobentests wurden die Mittelwerte der standardisierten Fragebögen der Stichprobe mit Werten aus Normierungs- oder repräsentativen Stichproben verglichen.

Die Zusammenhänge zwischen den pandemiespezifischen Beschränkungen und der mütterlichen Belastung bzgl. des Schlaf-, Schrei- und Fütter-/Essverhaltens sowie der wahrgenommenen Probleme des kindlichen Verhaltens während der Zeit der stärksten Beschränkungen – 1) „mehr quengelte/schrie/weinte“; 2a) „länger brauchte, um abends einzuschlafen“; 2b) „häufiger in der Nacht wach wurde“; 3) „eingeschränkter aß“ – wurden mittels MANOVAs überprüft.

Mit einem Set aus rückwärtsgerichteten hierarchischen multiplen linearen Regressionen wurde exploriert, inwiefern die Belastung der Mütter durch das kindliche Schrei-, Schlaf- und Fütter-/Essverhalten (nicht anhand der klinischen Kriterien) mit Stresserleben und Depressivität sowie anhand von Bonding und Partnerschaftszufriedenheit aufgeklärt werden kann. Hierbei waren die Angaben der Mütter zur Belastung durch das Verhalten der Kinder die Kriterien und die Summenwerte der Fragebögen PSS-10, EPDS, PBQ-16 und PFB-K die Prädiktoren. Eine Variable wurde als Prädiktor eliminiert, wenn die empirische Fehlerwahrscheinlichkeit erster Art für den Ausschluss der Variable bei $p \geq .10$ lag. Dadurch können Prädiktoren mit kleinen, aber möglicherweise bedeutsamen Effekten im Modell verbleiben.

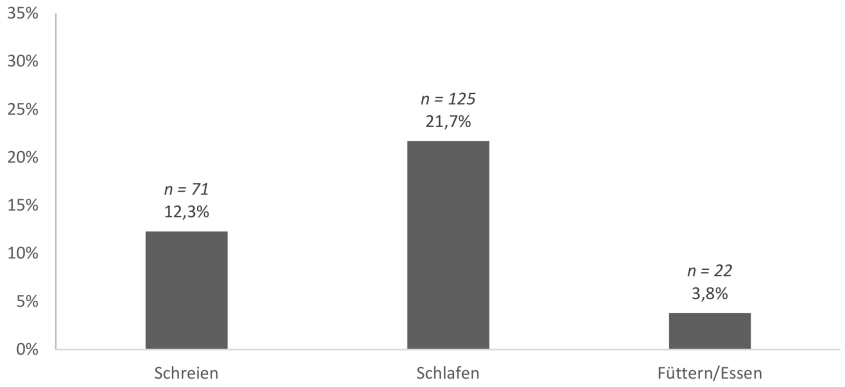
Eine weitere MANOVA wurde gerechnet, um zu untersuchen, wie sich die psychische Belastung der Mütter (abhängige Variablen: Angaben zum Ausmaß der Belastungen durch das kindliche Schrei-, Schlaf- und Fütter-/Essverhalten sowie die Summenwerte der Fragebögen PFB-K, PSS-10, EPDS und PBQ-16) unterscheidet in Bezug auf die unabhängigen Variablen und deren Interaktionsterme: 1) das Alter (in Monaten), 2) das Vorhandensein von mindestens einem Geschwisterkind und 3) das Erleben von vermehrtem Schreien als stark oder sehr stark und längerer Einschlaflatenz (> als 45 Minuten) in der Zeit der stärksten Beschränkungen.

Ergebnisse

Beschränkungen sowie Zusammenhänge mit mütterlicher Belastung und dem Verhalten der Kinder

Die meisten Mütter berichteten Veränderungen in der alltäglichen Lebenssituation: Berufliche Veränderungen zeigten sich weniger bei den Müttern (28.4 %), sondern vermehrt bei den Vätern (66.6 %), überwiegend durch eine Verlegung der Arbeit ins Homeoffice (41.2 %) oder Kurzarbeit (15.5 %). Eine Einschränkung des Kontakts zu den eigenen Eltern berichteten 79.5 %, zu Familienangehörigen 88.7 % und zu Freundinnen und Freunden 92.5 % der Mütter. In den Familien, in denen sich das Netto-Haushaltseinkommen reduzierte (23.2 %), betrug die Reduktion durchschnittlich 29.2 % (SD = 18.4). Diese Beschränkungen hatten weder einen signifikanten Einfluss auf die retrospektiv berichtete mütterliche Belastung durch das Schrei-, Schlaf- und Fütter-/Essverhaltens des Kindes ($F(3,570) \leq 1.04$, $p \geq .413$), noch auf die von den Müttern beschriebene kindliche Problematik – 1) „mehr quengelte/schrie/weinte“; 2a) „länger brauchte, um abends einzuschlafen“; 2b) „häufiger in der Nacht wach wurde“; 3) „eingeschränkter aß“ – zur Zeit der stärksten Pandemie-Beschränkungen ($F(4,572) \leq 2.16$, $p \geq .072$).

Einen Mangel an medizinischer, psychotherapeutischer oder sonstiger Versorgung erlebten 23.6 % der Mütter. Bezüglich dieses Mangels gab es signifikante multivariate Haupteffekte auf sowohl die mütterlichen Belastungen durch das kindliche Verhalten (Schreien, Schlafen, Füttern/Essen; $F(3,573) = 7.68$, $p < .001$, $\eta_p^2 = .04$) als auch die subjektiv beschriebene kindliche Problematik zur Zeit der stärksten Pandemie-Beschränkungen ($F(4,572) = 3.30$, $p < .05$, $\eta_p^2 = .02$). Die Mütter, die angaben, einen Mangel erlebt zu haben, gaben signifikant höhere Belastungen bzgl. des Schrei- ($M = 2.94$, $SD = 1.45$), Schlaf- ($M = 2.51$, $SD = 1.49$), Fütter- und Essverhaltens ($M = 1.94$, $SD = 1.35$; $F(1,575) \geq 6.71$, $p \leq .05$) an. Ebenso machten die Mütter, die einen Mangel angaben, signifikant höhere Angaben zu vermehrtem kindlichem Schreien ($M = 2.11$, $SD = 1.36$), Ein- ($M = 2.18$, $SD = 1.46$) und Durchschlafschwierigkeiten ($M = 2.07$, $SD = 1.41$) und eingeschränk-



Anmerkungen: Häufigkeiten (%) des kindlichen Schreiens (bewertet als „vermehrt und schwer tröstbar"), der Ein- und Durchschlafprobleme (Mittelwert über alle Kinder mit einer auffällig langen Einschlaflatenz, 11.5 % der drei- bis sechsmonatigen, 46.9 % der sechs- bis achtmonatigen und 45.28 % der über achtmonatigen Kinder) und Schwierigkeiten im Ess-/Fütterverhalten. N = 577; im Bereich „Schlafen" n = 2 fehlende Angaben.

Abbildung 1. Angaben der Mütter zu kindlichen Verhaltensauffälligkeiten (Schreien, Schlafen, Füttern/Essen).

tem Essverhalten (M = 1.51, SD = 1.05) als die Mütter, die keinen Mangel erfahren hatten (F(1,575) ≥ 4.08, p ≤ .05).

Keine der befragten Mütter war selbst an COVID-19 erkrankt. Jedoch gaben 41.4 % sehr starke Sorgen vor einer Infektion in der Familie an. Neben den möglichen Belastungen erlebten 66.9 % durch die Pandemie-Situation auch Chancen. 31.4 % gaben an, dass sie mehr Zeit für ihr Kind hatten, weil eigene Termine und Verpflichtungen wegfielen, 27.4 %, weil der Partner mehr zu Hause war, 3.5 %, weil sie selbst weniger und 7.6 %, weil sie gar nicht arbeiteten.

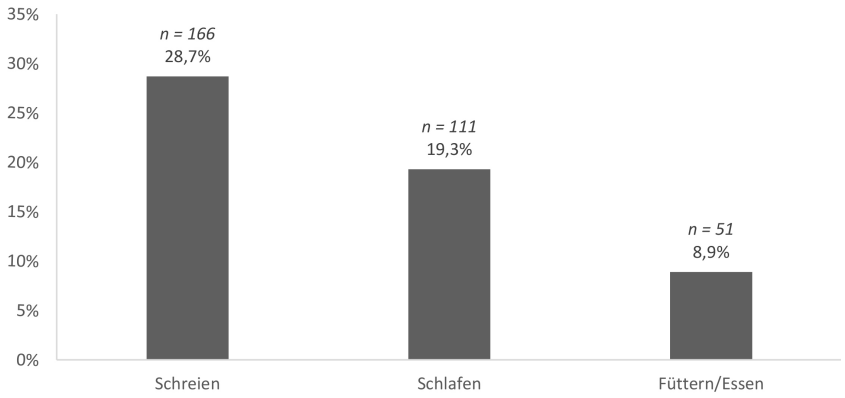
Verhalten der Kinder und Zusammenhänge mit der mütterlichen Belastung

Die klinischen Kriterien einer „exzessiven Schreistörung" (Wessel-Regel) erfüllten zum Zeitpunkt der Befragung 9 von 577 Kindern (1.6 %). Dies ist ein geringer Anteil im Vergleich zu Prävalenzraten einer deutschen Stichprobe (16.3 % der Kinder innerhalb der ersten drei Lebensmonate, ab drei Monaten 5.8 %, ab sechs Monaten 2.5 %; von Kries, Kalies & Papoušek, 2006; im Telefonscreening erhoben). Die Frage, ob das Kind sehr häufig schreit und schwer zu trösten ist, bejahten 12.3 % (Abbildung 1). Unabhängig davon gab mehr als jede vierte Mutter (28.7 %) an, zur Zeit der Beschränkung durch Schreien/Quengeln stark oder sehr stark belastet gewesen zu sein (Abbildung 2).

Auffälliges Schlafverhalten (> 90. Perzentil) während der größten Beschränkungen gab es bei fast jedem vierten Kind (21.7 %), mit einer auffällig langen Einschlaflatenz bei 11.5 % der drei- bis sechsmonatigen, 46.9 % der sechs- bis achtmonatigen und 45.3 % der über achtmonatigen Kinder (Abbildung 1). Durchschlafprobleme im Sinne der DC:0–5 zeigten 11.1 % der über acht Monate alten Kinder (> dreimal pro Nacht für länger als 30 Minuten wach). Bei der oben zitierten Studie waren – bei weniger strenger Definition – 12.9 % der bis zu Einjährigen als schlecht schlafend eingeschätzt worden (von Kries et al., 2006). Außerdem gab fast jede fünfte Mutter (19.3 %) an, durch das Schlafverhalten ihres Kindes stark oder sehr stark belastet gewesen zu sein (Abbildung 2).

Auffälliges Fütter-/und Essverhalten nach den Kriterien DC:0–5 zeigten nach Angaben der Mütter insgesamt 3.8 % aller Kinder während der stärksten Beschränkungen (Abbildung 1) vs. 1.4 % bei von Kries et al. (2006). Zudem gaben 8.9 % der Mütter eine starke oder sehr starke Belastung durch das Fütter-/und Essverhalten ihres Kindes an (Abbildung 2).

Zusätzlich zu den klinischen Kriterien wurden Veränderungen der kindlichen Verhaltensweisen zur Zeit der stärksten Beschränkungen erfasst, mit den Fragen, inwiefern das Kind 1) „mehr quengelte/schrie/weinte"; 2a) „länger brauchte, um abends einzuschlafen"; 2b) „häufiger in der Nacht wach wurde"; 3) „eingeschränkter aß". Die so erfassten kindlichen Verhaltensweisen korrelierten positiv untereinander (r(577) ≥ .47, p ≤ .001). Ebenso korrelierten die mütterlichen Belastungen positiv bezüglich des Schrei-, Schlaf- und Fütter-/Essverhaltens während der Zeit der stärksten Beschränkungen (r(577) ≥ .52, p ≤ .001).



Anmerkungen: Wahrgenommene Belastung der Mütter (*stark* und *sehr stark*) in dem jeweiligen Bereich. *N* = 577, keine fehlenden Angaben.

Abbildung 2. Mütterliche Belastung bzgl. kindlicher Verhaltensauffälligkeiten (Schreien, Schlafen, Füttern/Essen).

Psychisches Befinden, Bonding und Partnerschaftszufriedenheit

Im Screening zu Depressivität (EPDS: $M = 7.53$, $SD = 5.45$) lagen 33.3 % über dem klinischen Cut-off (≥ 10), wobei 13.5 % im Bereich des Risikos zur Entwicklung einer minoren depressiven Episode (≥ 10 und < 13) und 19.8 % im Bereich einer majoren depressiven Episode (≥ 13) lagen. Diese Raten sind erhöht im Vergleich zu Studien mit Müttern in den ersten drei Monaten (17 % bei von Ballestrem, Strauß & Kächele, 2005; 23.6 % bei Reck et al., 2008). Das Stresserleben (PSS-10: $M = 17.65$, $SD = 6.71$) war im Vergleich zur Normstichprobe (von Frauen zwischen 20–39 Jahren, allerdings in einer anderen Übersetzung: Klein et al., 2016) deutlich erhöht ($t(576) = 15.41$, $p < .001$, $d = 1.28$). Das Bonding (PBQ-16: $M = 9.75$, $SD = 6.39$) war im Vergleich zur repräsentativen Stichprobe bei Reck et al. (2006) verschlechtert ($t(576) = 9.09$, $p < .001$, $d = 0.75$) und lag in der Höhe einer Subgruppe von Müttern mit postpartaler Depression. Die Partnerschaftsqualität (PFB-K: $M = 18.53$, $SD = 5.22$) war vergleichbar mit den Normwerten bei Kliem et al. (2012), ($t(565) = -.30$, $p = .768$, $d = 0.20$).

Im finalen Modell der hierarchischen Regression wiesen die Prädiktoren Stress, Partnerschaftszufriedenheit und das Bonding einen Zusammenhang mit der retrospektiv eingeschätzten Belastung der Mutter durch das Schreien des Kindes mit einer Varianzaufklärung von 20.5 % ($F(3,562) = 49.57$, $p < .001$, $R^2_{adj} = 0.205$) und das Schlafverhalten des Kindes mit einer Varianzaufklärung von 17.3 % ($F(3,562) = 40.26$, $p < .001$, $R^2_{adj} = 0.173$) auf. Die Belastung durch das Schrei- als auch durch das Schlafverhalten war höher bei höherem Stresserleben sowie bei stärker beeinträchtigtem Bonding und geringerer Partnerschaftszufriedenheit (siehe Tabelle 1). Depressivität trug nicht signifikant zur Aufklärung der mütterlichen Belastung durch das Schrei- und Schlafverhalten der Kinder bei ($p > .202$). Das psychische Befinden der Mutter zeigte einen Zusammenhang mit der Belastung durch das Fütter-/Essverhalten des Kindes mit einer Varianzaufklärung von 11.8 % ($F(3,562) = 26.24$, $p < .001$, $R^2_{adj} = 0.118$). Die Belastung war höher bei vermehrtem Stresserleben und stärkerer Beeinträchtigung des Bondings (siehe Tabelle 1). Depressivität der Mutter trug nicht signifikant zur Aufklärung der Belastung der Mutter durch das kindliche Essverhalten bei ($p > .251$). Insgesamt scheinen die Regressionsmodelle nicht durch Multikollinearität beeinflusst zu sein, da die Varianzinflation der Prädiktoren zwischen *VIF* = [1.189; 2.295] lag.

Analyse der Faktoren in der Aufklärung der mütterlichen Belastung

MANOVAS (Hotellings T^2) ergaben signifikante multivariate Haupteffekte auf das psychische Befinden der Mütter und die Beziehungsmerkmale Bonding und Partnerschaftszufriedenheit für 1) vermehrtes Schreien und verlängerte Einschlaflatenz ($F(7,552) = 2.52$, $p < .05$, $\eta_p^2 = .03$); 2) dem Vorhandensein von mindestens einem Geschwisterkind ($F(7,552) = 6.78$, $p < .001$, $\eta_p^2 = .08$) und 3) dem Alter des letzten Kindes ($F(7,522) = 2.59$, $p < .05$, $\eta_p^2 = .03$). Außerdem ergab sich eine Wechselwirkung zwischen dem Vorhandensein mindestens eines Geschwisterkinds und dem Alter ($F(7,522) = 3.28$, $p < .01$, $\eta_p^2 = .04$).

Die univariaten post-hoc-Tests (siehe Tabelle 2) zeigten, 1) dass Mütter, die berichteten, dass ihr Kind vermehrt schrie und schwer tröstbar war oder die eine verlängerte Einschlaflatenz (> 45 Minuten) für die Zeit der stärksten Beschränkung angaben ($n = 221$), insgesamt hö-

Tabelle 1. Prädiktoren der retrospektiv eingeschätzten Belastung durch kindliches Verhalten: Finale Modelle der rückwärtsgerichteten hierarchischen Regressionen

Kriterium	Prädiktoren	*B*	*S.E.*	β	*t*	*p*	*Partial*
Belastung durch Schreien/Quengeln	Konstante	1.302	0.311	/	4.185	< .001	/
	PBQ-16	0.051	0.009	0.224	5.563	< .001	.167
	PFB-K	-0.023	0.011	-0.082	-2.028	.043	-.093
	PSS-10	0.062	0.009	0.285	6.731	< .001	.269
Belastung durch Schlafverhalten	Konstante	1.141	0.301	/	3.791	< .001	/
	PBQ-16	0.036	0.009	0.165	4.017	< .001	.194
	PFB-K	-0.024	0.011	-0.092	-2.225	.026	-.070
	PSS-10	0.059	0.009	0.286	6.609	< .001	.175
Belastung durch Fütter-/Essverhalten	Konstante	1.032	0.254	/	4.065	< .001	/
	PBQ-16	0.035	0.007	0.199	4.689	< .001	.228
	PFB-K	-0.015	0.009	-0.071	-1.663	.097	-.085
	PSS-10	0.032	0.008	0.188	4.220	< .001	.273

Anmerkungen: B = unstandardisiertes Regressionsgewicht; *S.E.* = Standardfehler; β = standardisiertes Regressionsgewicht; *t* = *t*-standardisiertes Regressionsgewicht; *p* = empirischer Fehler 1. Art; PBQ-16 = Postpartum Bonding Questionnaire – Kurzversion; PFB-K = Partnerschaftsfragebogen – Kurzversion, PSS-10 = Perceived Stress Scale; *Partial* = partielle Korrelation.

Tabelle 2. Zusammenhang (Haupteffekt) zwischen vermehrt wahrgenommenem Schreien und längerer Einschlaflatenz mit psychischer Belastung der Mutter, Bonding und Partnerschaftszufriedenheit (Deskriptive Statistiken und post-hoc ANOVAs)

	M (SD) (gesamt)	*Vergleichswert/Cut-off*		*M*	*SD*	*Effektvarianz*	*F*	*p*	η_p^2
PSS-10	17.65	13.34	Kind nicht auffällig[a]	16.44	6.39	88.49	2.1	.147	.004
	(6.71)	(*SD* = 6.75)	Kind auffällig[b]	19.38	6.76				
PBQ-16	9.75	7.33	Kind nicht auffällig[a]	8.92	5.87	72.64	1.84	.176	.003
	(6.39)	(*SD* = 6.14)	Kind auffällig[b]	11.19	6.91				
PFB-K	18.54	18.6	Kind nicht auffällig[a]	19.01	4.79	39.79	1.54	.176	.003
	(5.22)	(*SD* = 4.5)	Kind auffällig[b]	17.80	5.77				
EPDS	7.53	< 10	Kind nicht auffällig[a]	6.51	5.16	29.72	1.08	.300	.002
	(5.45)		Kind auffällig[b]	8.92	5.40				
Belastung durch Schreien	2.46	–	Kind nicht auffällig[a]	2.19	1.37	10.52	5.77	.017	.010
	(1.45)		Kind auffällig[b]	2.0	1.46				
Belastung durch Schlafverhalten	1.08	–	Kind nicht auffällig[a]	1.74	1.14	26.83	16.57	< .001	.029
	(1.34)		Kind auffällig[b]	2.6	1.54				
Belastung durch Fütter-/und Essverhalten	1.65	–	Kind nicht auffällig[a]	1.51	0.99	8.331	6.87	< .01	.012
	(1.12)		Kind auffällig[b]	1.87	1.27				

Anmerkungen: M (SD) = Mittelwert und Standardabweichung der gesamten Stichprobe; für Quellenangaben zu den Vergleichswerten siehe Ergebnisse; *M* = Mittelwert, *SD* = Standardabweichung, Effektvarianz = Typ III, *F* = *F*-standardisierte Effektvarianz, *p* = empirischer Fehler 1. Art, η_p^2 = partielle Effektstärke Eta-Quadrat, PSS-10 = Perceived Stress Scale, PBQ-16 = Postpartum Bonding Questionnaire, PFB-K = Partnerschaftsfragebogen – Kurzversion, EPDS = Edinburgh Postnatal Depression Scale, [a]*n* = 345, [b]*n* = 221.

here Belastungen bezüglich des Schrei-, Schlaf- und Fütter-/Essverhaltens zeigten ($F(1,558) \geq 5.77$, $p \leq .017$, $\eta_p^2 \geq .01$), aber keine signifikanten Unterschiede bei Stress (PSS-10), Bonding (PBQ-16), Depressivität (EPDS) und Zufriedenheit mit der Partnerschaft (PFB-K; $F(1,558) \leq 2.11$, $p \geq .147$) als die Mütter, die angaben, dass ihr Kind nicht vermehrt schrie und schwer tröstbar war und in weniger als 45 Minuten einschlief ($n = 345$). 2) Mütter, die mind. ein Geschwisterkind zu Hause hatten, zeigten signifikant mehr Stress (PSS; $M = 18.51$, $SD = 6.85$), weniger Partnerschaftszufriedenheit (PFB-K; $M = 17.39$, $SD = 5.21$) sowie mehr Belastung durch das kindliche Schreien ($M = 2.83$, $SD = 1.52$; $F(1,558) \geq 4.84$, $p \leq .028$, $\eta_p^2 \geq .09$). 3) Das Alter hing signifikant mit dem Bonding (PBQ-16) und der Belastung der Mütter durch das Schlaf- und Schreiverhalten zusammen ($F(1,558) \geq 6.25$, $p \leq .013$, $\eta_p^2 \geq .01$): Je älter die Kinder, desto belastender das Schrei-, ($r(577) = .14$, $p < .01$) und Schlafverhalten ($r(577) = .11$, $p < .01$) und gleichzeitig desto beeinträchtigter das Bonding ($r(577) = .10$, $p < .05$). Die Wechselwirkung Alter x Geschwister-

kind schließlich zeigte nur auf die Belastung durch das Fütter- und Essverhalten einen signifikanten Effekt ($F(1,558) = 6.53$, $p < .05$, $\eta_p^2 = .01$). Dieser ist darauf zurückzuführen, dass der Zusammenhang zwischen Alter und Belastung durch das Fütter-/Essverhalten nur in der Gruppe der Mütter, bei denen ein Geschwisterkind im Haushalt lebt, statistisch signifikant ist: $r(254) = .14$, $p < .05$; je höher das Alter, desto höher die Belastung.

Diskussion

Das Ziel der vorliegenden Arbeit war es, kindliche Verhaltensauffälligkeiten in der vulnerablen Phase des ersten Lebensjahres und die damit im Zusammenhang stehende Belastung der Mütter in der Zeit der COVID-19-Pandemie zu untersuchen sowie für diese Lebensphase spezifische zusätzliche Stressoren und Schutzfaktoren zu identifizieren.

Zum Zeitpunkt der Erhebung berichteten die Mütter allgemein ein erhöhtes Risiko für eine depressive Episode und ein erhöhtes Stressniveau. Diese Ergebnisse reihen sich ein in Befunde zu erhöhten Depressivitätswerten in der Peri- und Postpartalzeit seit Beginn der Pandemie (z. B. Ceulemans et al., 2021) sowie in Befunde zu allgemein erhöhten Stresswerten in der Bevölkerung (Kowal et al., 2020). Für die Zeit der stärksten Beschränkungen gab fast ein Fünftel der Mütter eine hohe Belastung durch das Schlafverhalten ihrer Kinder an.

Insgesamt betrachtet wurde für 21.7 % der Kinder von verlängerten Einschlaflatenzen (> 90. Perzentil) oder vermehrten Durchschlafschwierigkeiten berichtetet. Dies steht in Übereinstimmung mit einer israelischen Studie, in der zu Beginn der Pandemie eine Verschlechterung der Schlafdauer und -qualität von rund einem Drittel der Mütter bei ihren Kindern ab sechs Monaten berichtet wurde (Zreik, Asraf, Haimov & Tikotzky, 2021).

Insgesamt gab mehr als ein Viertel der Mütter eine hohe Belastung durch Schreien oder Quengeln in der Zeit der stärksten Beschränkungen an. Im Vergleich zu dieser wahrgenommen Belastung erscheinen entgegen unserer Erwartung die Prävalenzen von auffälligem Verhalten, abgefragt anhand klinischer Kriterien (exzessives Schreien 1.6 %), als niedrig.

Fütter- und Essprobleme bei den Kindern spielten in der vorliegenden Studie bei einer geringen Prävalenz von 3.8 % nur eine untergeordnete Rolle.

In den multiplen Regressionsanalysen zeigte sich, dass auch die subjektiv berichtete mütterliche Belastung durch das Schrei- und Schlafverhalten der Kinder mit erhöhten Stresswerten zusammenhing. Dieser Zusammenhang zeigte sich hinsichtlich Depressivität jedoch nicht. Depressivität könnte eher im Zusammenhang mit anderen Faktoren (wie z. B. chronischer Belastung, depressiver Vorerkrankung) stehen (Reck et al., 2008). Erwartungsgemäß erlebten die Mütter weniger Belastung im Zusammenhang mit positiven Beziehungsmerkmalen (Bonding, Partnerschaftszufriedenheit). Stabile familiäre Beziehungen sind bekannt als protektive Faktoren in der Entwicklung postpartaler psychischer Probleme (z. B. Reck et al., 2016).

Höhere Belastungen durch das kindliche Verhalten gaben vor allem Mütter an, die ein Geschwisterkind zu Hause hatten, einen Mangel an medizinischer, psychotherapeutischer oder sonstiger Versorgung wahrnahmen, oder die angaben, dass ihr Kind verstärkt schrie oder lange brauchte, um einzuschlafen (> 45 Minuten). Mit dem Alter des Kindes stieg die Belastung durch das Schrei-, Schlaf-, Fütter- und Essverhalten ebenso wie das Ausmaß der Beeinträchtigung des Bondings. Dieser Befund könnte durch den in der Vergangenheit häufig nachgewiesenen Zusammenhang des kindlichen Schreiens mit der mütterlichen Müdigkeit und Erschöpfung erklärt werden (insbesondere durch Unterbrechungen des zirkadianen Rhythmus und weniger Ruhezeiten insgesamt; Kurth, Kennedy, Spichiger, Hösli & Zemp Stutz, 2011). Während der Beschränkungen im Zuge der Pandemie könnte sich dies noch einmal verschärft haben. Ebenso reihen sich diese Befunde in die Ergebnisse aktueller Studien zur Situation von Familien in der COVID-19-Pandemie ein, die vermehrtes familiäres „Chaos“ in alltäglichen Abläufen, mehr Hektik und Anspannung zu Hause abbilden (Johnson et al., 2021, erhoben mit der Confusion, Hubbub, and Order Scale; CHAOS, Matheny, Wachs, Ludwig & Phillips, 1995). Dies geht einher mit steigender mütterlicher Belastung (erhöhter Stress, weniger Schlaf und schlechtere Schlafqualität), wobei gilt: Je mehr Kinder im Haushalt, vor allem jüngere, desto mehr familiäres „Chaos“ (Kracht, Katzmarzyk & Staiano, 2021). Im Kontext des Risiko- und Resilienzmodells von Prime et al. (2020) wiederum können zunehmendes Lebensalter des Kindes (und damit bereits länger andauernde Belastung), das Vorhandensein von Geschwisterkindern sowie ein reduzierter Zugang zum Versorgungssystem als Risikofaktoren (letzterer pandemiespezifisch) für mütterliche Belastung und eine beeinträchtigte Eltern-Kind-Beziehung verstanden werden. Finanzielle Einbußen, Arbeitsverlust, weniger Kontakt zu Freundinnen und Freunden sowie Kolleginnen und Kollegen schienen keinen zusätzlichen Einfluss auf die Belastung zu haben.

Limitationen

Die Daten wurden ausschließlich per Online-Befragung erhoben. Die Bedingungen während der Erhebung konnten nicht kontrolliert werden (Ablenkung, Mehrfachteilnahme, Unterschiede in der Darstellung auf verschiedenen Geräten). Darüber hinaus lässt der überdurchschnittlich hohe Bildungsgrad der Mütter keine Generalisierung der Ergebnisse zu.

Neben standardisierten Messinstrumenten wurde ein von der Arbeitsgruppe entwickelter Fragebogen eingesetzt. Die Gründe dafür waren, dass (1) gerade auch die Belastung in der Zeit der stärksten Beschränkungen zu Beginn der Pandemie erfasst werden sollte, was nur retrospektiv möglich war und (2) keine pandemiespezifischen Instrumente vorlagen. Es existieren keine Vergleichsdaten einer nicht betroffenen Kontrollgruppe. Darüber hinaus können aufgrund der Erhebung im Querschnitt sowie quasiexperimentell definierter Analysedesigns aus den Ergebnissen keine Kausalschlüsse gezogen werden. Zukünftige Untersuchungen sollten longitudinal erfolgen, möglichst im Cross-Lagged-Panel-Design, um die Wirkrichtungen der beobachteten Zusammenhänge abschätzen zu können.

Die erhobenen Konstrukte weisen zum Teil eine inhaltliche Nähe auf, wie z. B. wahrgenommener Stress und Belastung durch das kindliche Verhalten. Ein Teil der Varianzaufklärung könnte hier begründet liegen. Die Effektstärken für die Zusammenhänge in der vorliegenden Studie sind größtenteils als klein einzuordnen.

Schlussfolgerungen

Die Ergebnisse dieser Studie weisen darauf hin, dass die mit der COVID-19-Pandemie einhergehenden Belastungen in der vulnerablen Phase des ersten Lebensjahres ein Risiko für die psychische Gesundheit von Müttern darstellen. Verstärkend auf die Belastung scheinen die Anforderungen in der Versorgung gerade junger Kinder und Geschwisterkinder sowie gleichzeitig ein erlebter Mangel an medizinischer, psychotherapeutischer oder sonstiger Versorgung zu wirken. Einen entlastenden Einfluss kann man hingegen sowohl für ein positives Beziehungserleben bzw. die Verbundenheit der Mutter zum Kind als auch für Zufriedenheit in der Partnerschaft annehmen. In der Prävention psychischer Belastung von Müttern in der Zeit der COVID-19-Pandemie sollte die Stärkung innerfamiliärer Beziehungen sowie der Zugang zu Mutter-Kind-spezifischer gesundheitlicher Versorgung und eine Entlastung in der Betreuung von Geschwisterkindern im Fokus stehen. Zukünftige Untersuchungen könnten zeigen, über welche Faktoren pandemiespezifische psychosoziale Stressoren die frühe Verhaltensregulation beeinflussen (z. B. über die Stressregulationskompetenz der Mutter, adäquate Co-Regulation).

Elektronische Supplemente (ESM)

Die elektronischen Supplemente sind mit der Online-Version dieses Artikels verfügbar unter https://doi.org/10.1026/0942-5403/a000373

ESM 1. Auszüge aus dem Fragebogen der „CoviFam"-Studie

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